Voltaire Grid Director ISR 2012 and ISR 2004

Installation Manual

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Voltaire Part Number: [DOC-00047]

Safety Information

English - Safety Information

Before you install, operate, or service the system, read carefully the following Safety information.

Product Disposal Warning

CAUTION

Ultimate disposal of this product should be handled according to all national laws and regulations.

This product may contain sealed lead acid, nickel cadmium, nickel metal hydride, lithium, or lithium ion battery. The battery must be recycled or disposed of properly. Recycling facilities may not be available in your area. Batteries or packaging for batteries are labeled in accordance with European Directive 2006/66/EC concerning batteries and accumulators and waste batteries and accumulators. The Directive determines the framework for the return and recycling of used batteries and accumulators as applicable throughout the European Union.

Notice:

This mark applies only to countries within the European Union (EU)

For Taiwan:

Please recycle batteries

廢電池請回收

This label is applied to various batteries to indicate that the battery is not to be thrown away, but rather reclaimed upon end of life per this Directive.

In accordance with the European Directive 2006/66/EC, batteries and accumulators are labeled to indicate that they are to be collected separately and recycled at end of life. The label on the battery may also include a chemical symbol for the metal concerned in the battery (Pb for lead, Hg for mercury and Cd for cadmium). Users of batteries and accumulators must not dispose of batteries and accumulators as unsorted municipal waste, but use the collection framework available to customers for the return, recycling and treatment of batteries and accumulators. Customer participation is important to minimize any potential effects of batteries and accumulators on the environment and human health due to the potential presence of hazardous substances.

China RoHS HBA Toxic Substance Table

CAUTION

The China RoHS HBA toxic substance table below allows checking the ISR 2012/2004 for toxic substances according to criteria particular to China.

部件名称 (Part Name)	有毒有害物质或元素 (Toxic or Hazardous Substances and Elements)					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr6+)	多溴联苯 (PBB)	多溴二苯醚(PBDE)
金属部件 (包括紧固件) Metal Parts (including fasteners)	0	0	0	0	0	0
印刷电路板组件和元件 Printed circuit assemblies and components	X	0	0	0	0	0
塑料和聚合物部件 Plastic and Polymeric parts	0	0	0	0	0	0
除印刷电路板外的其他电子组件 Other electronic assembly beside PCB	X	0	0	0	0	0

Power Disconnection Warning

CAUTION

The ISR 2012/2004 has multiple sources of power. Ensure that all power cables are disconnected before installing the chassis or before performing procedures requiring access to the interior of the chassis.

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Power Supply Warning

CAUTION

Do not touch the power supply when the power cord is connected. For systems with a power switch, line voltages are present within the power supply even when the power switch is off and the power cord is connected. For systems without a power switch, line voltages are present within the power supply when the power cord is connected.

CAUTION

Do not subject the product to electrical main power over voltage: The product must be used at the rated supply voltages indicated on the product front panel only.

CAUTION

Do not plug the product into an overloaded electrical outlet. This may result in fire or electrical shock.

Power Supply Cord

CAUTION

For North American power connection, select a power supply cord that is UL Listed and CSA Certified 3 - conductor, [18 AWG], terminated in a molded on plug cap rated 125 V, [15 A], with a minimum length of 1.5m [six feet] but no longer than 4.5m. For European connections, select a power cord that is internationally harmonized and marked "<HAR>", 3 - conductor, 0.75 mm2, minimum mm2 wire, rated 300 V, with a PVC insulated jacket. The cord must have a molded on plug cap rated 250 V, 10 A.

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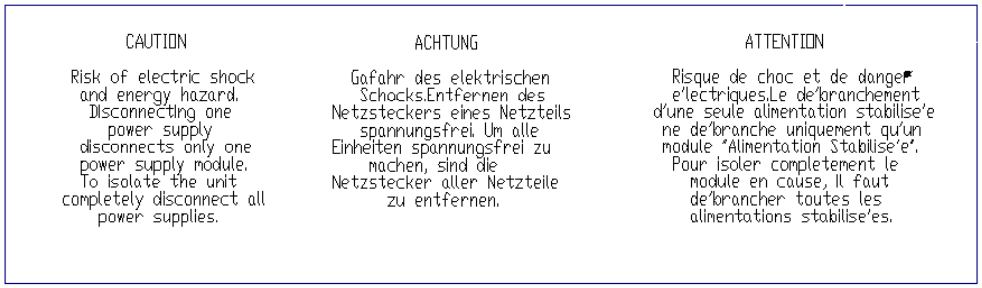
Main Disconnecting Device

CAUTION

The plug-socket combination must be accessible at all times, because it serves as the main disconnecting device.

The following label/marking is also attached to unit


CAUTION
Risk of electric shock and energy hazard. Disconnecting one power supply disconnects only one power supply module. To isolate the unit completely disconnect all power supplies.
ACHTUNG
Gafahr des elektrischen Schocks.Entfernen des Netzsteckers eines Netzteils spannungsfrei. Um alle Einheiten spannungsfrei zu machen, sind die Netzstecker aller Netzteile zu entfernen.
ATTENTION
Risque de choc et de danger e'lectriques.Le de'branchement d'une seule alimentation stabilise'e ne de'branche uniquement qu'un module "Alimentation Stabilise'e". Pour isoler completement le module en cause, Il faut de'brancher toutes les alimentations stabilise'es.

Ground Connection Warning

CAUTION

When installing the unit, always make the ground connection first and disconnect it last.

Grounded Equipment Warning

CAUTION

This equipment must be grounded. Ensure that the host is connected to earth ground during normal use. The unit shall be connected to an earthed mains power outlet.

Ground Conductor Warning

NOTE

The ISR 2012/2004 is delivered with a grounding stud kit. No grounding connection is necessary when fewer than two power supplies are installed. However, you may still want to install a grounding stud on an ISR 2012/2004 is for subsequent upgrading. For further information. For further information, refer to the Chassis Grounding Section, on page 5-4.

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CAUTION

When using more than two power supplies, a dangerous leakage current (touch current) is emitted. The unit must be grounded via the external grounding stud when more than two sPSUs are installed.

Wires shall be used as follows:

Unit rated 28A: 4 mm2 min, 10 AWG

Unit rated 15A: 1.5 mm2 min, 14 AWG

Unit rated 11A: 1.25 mm2 min, 16AWG

The ground wire to the grounding stud must be connected prior to connecting the unit to the mains power.

CAUTION

Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.

Elements Warning

CAUTION

To prevent fire or shock hazard, do not expose this equipment to the environment of Humidity and/or dust. Do not use this equipment in an unprotected outdoor installation or any area classified as a wet area.

CAUTION

Direct sunlight or an intense source of heat, direct or ambient, must not be introduced to the product either by induction or contact.

CAUTION

Provide adequate ventilation so that thermal characteristics do not cause an increase in product temperature to resulting in overheating.

CAUTION

Do not clean the unit by using electrically conductive or corrosive chemicals. Always be certain to unplug the unit from AC wall power before any major cleaning. Use a damp cloth only for cleaning.

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Enclosure Warning

CAUTION

Always keep the product on a stable and secure base or enclosure. Do not drop the product or subject it to sudden heavy impact.

Sharp Object Warning

CAUTION

Object Ingress and Liquid Entry: Never insert or push sharp metal objects into the product or use such devices for an attempt at opening or servicing the product. Servicing should be referred to a trained and qualified technician only. Do not allow liquid of any type to enter the unit. Do not allow the unit to be submersed in water as this may cause a shock hazard.

Qualified Personnel Warning

CAUTION

Only trained and qualified personnel should be allowed to install or replace this equipment.

CAUTION

A trained qualified technician should perform all servicing of the unit. There are no serviceable components within the unit for user access.

Wrist Strap Warning

CAUTION

When handling electronic cards, also referred to as boards, wear grounding wrist straps to avoid ESD damage to the card. Do not directly touch the backplane with your hand or any metal tool, or you could shock yourself.

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Laser Radiation Warning

CAUTION

Because invisible laser radiation may be emitted from the aperture of the port when no cable is connected, avoid exposure to laser radiation and do not stare into open apertures. Laser modules are class I laser according to EN60825 and FDR CFR 21(J).

Laser modules are defined as class I laser modules and comply with EN60825 and FDR CFR 21(J) CLASS 1 LASER PRODUCT. They are referenced to the most recent laser standards IEC 60 825-1:1993 + A1:1997 + A2:2001 and EN 60825-1:1994+A1:1996+ A2:2001".

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French - Informations de sécurité

Avant l'installation, la mise en route ou la révision du système, lisez très attentivement ces Informations de sécurité.

Elimination du produit

ATTENTION

L'élimination de ce produit doit se dérouler conformément aux lois et réglementations internationales.

Personnel qualifié

ATTENTION

Seul un personnel formé et qualifié est autorisé à installer ou à remplacer cet équipement.

ATTENTION

Seul un technicien agréé doit effectuer la révision de cet appareil. L'utilisateur ne peut accéder à aucune pièce de rechange.

Mise hors tension

ATTENTION

L'ISR 2012/2004 possède plusieurs sources d'alimentation. Veillez à ce que tous les câbles soient bien déconnectés avant d'installer le châssis ou avant d'effectuer toute procédure nécessitant l'accès à l'intérieur du châssis.

Alimentation

ATTENTION

Ne touchez pas l'alimentation quand le câble d'alimentation est déconnecté. Pour les systèmes à commutateur, le voltage existe même lorsque le commutateur est sur OFF et que le câble est branché. Pour les systèmes sans commutateur, le voltage existe au point d'alimentation même quand le câble d'alimentation est connecté.

ATTENTION

Ne soumettez pas le produit à une surtension. Le produit doit être utilisé aux voltages indiqués sur le panneau avant du produit.

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ATTENTION

Ne branchez pas le produit dans une prise exagérément sollicitée. Ceci pourrait entraîner un incendie ou un choc électrique.

Câble d'alimentation

ATTENTION

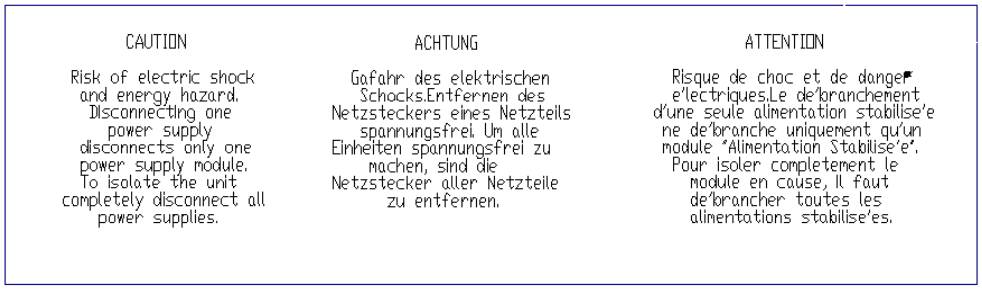
Pour l'Amérique du nord, prenez un câble d'alimentation UL et certifié CSA 3 - conducteur, [18 AWG], avec une fiche surmoulée 125 V, [15 A], d'une longueur minimum de 1,5 m [six pieds] mais ne dépassant pas 4, 5 m. Pour l'Europe, prenez un câble d'alimentation "<HAR>", 3 - conducteur, 0.75 mm2, fil minimum mm2, 300 V, avec une gaine isolante en PVC. Le câble doit avoir une fiche surmoulée 250 V, 10 A.

Sectionnement principal

ATTENTION

La prise doit rester accessible à tout moment car elle sert d'appareil de sectionnement principal.

L'étiquette suivante apparaît sur l'appareil.


CAUTION
Risk of electric shock and energy hazard. Disconnecting one power supply disconnects only one power supply module. To isolate the unit completely disconnect all power supplies.
ACHTUNG
Gafahr des elektrischen Schocks.Entfernen des Netzsteckers eines Netzteils spannungsfrei. Um alle Einheiten spannungsfrei zu machen, sind die Netzstecker aller Netzteile zu entfernen.
ATTENTION
Risque de choc et de danger e'lectriques.Le de'branchement d'une seule alimentation stabilise'e ne de'branche uniquement qu'un module "Alimentation Stabilise'e". Pour isoler completement le module en cause, Il faut de'brancher toutes les alimentations stabilise'es.

Mise à la terre

ATTENTION

En installant l'appareil, connectez tout d'abord la terre et déconnectez-la en dernier.

Equipement mis à la terre

ATTENTION

Cet équipement doit être mis à la terre. Veillez à ce que l'hôte soit connecté à la terre pendant l'utilisation normale. L'appareil doit être connecté à une prise à la terre du secteur.

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Conduction à la terre

NOTE

L'ISR 2012/2004 est fourni avec un kit pour plot à la terre. Aucune mise à la terre n'est nécessaire quand l'appareil fonctionne avec moins de deux sources d'alimentation. Cependant, vous pouvez installer un plot de mise à la terre pour une mise à niveau éventuelle de l'ISR 2012/2004. Pour de plus amples informations, reportez-vous à la page 5-3.

ATTENTION

En utilisant plus de deux sources d'alimentation, un dangereux courant de fuite survient. Dans ce cas, l'appareil doit être mis à la terre via un plot externe de mise à la terre.

Utilisation des câbles :

Régime 28 A; 4 mm^2 min.; 10 AWG;

Régime 15 A; 1,5 mm^2 min.; 14 AWG

Régime 11A: 1.25 mm^2 min, 16 AWG

Le fil de mise à la terre au plot de mise à la terre doit être branché avant de brancher l'appareil au secteur.

ATTENTION

Ne jamais enlever le conducteur de terre ou faire fonctionner l'équipement sans conducteur de terre correctement installé. Contactez l'inspection des services électrique ou un électricien si vous n'êtes pas sûr d'avoir une mise à la terre correcte .

Bracelet

ATTENTION

En manipulant des cartes électroniques, portez des bracelets de mise à la terre pour éviter que les décharges électrostatiques n'endommagent la carte. Ne touchez pas directement le fond de panier avec vos mains ou un outil en métal pour ne pas vous électrocuter.

Composants

ATTENTION

Pour éviter tout danger ou risque d'incendie, n'exposez pas cet équipement à l'humidité ou la poussière ambiante. Ne pas utiliser cet appareil à l'extérieur sans protection ou dans tout endroit classé comme humide.

ATTENTION

Eviter toute source de chaleur directe ou non, par induction ou contact avec le produit.

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ATTENTION

Veillez à avoir une ventilation adéquate pour respecter les plages de fonctionnement et ne pas avoir de surchauffe du produit.

ATTENTION

Ne pas nettoyer l'appareil avec des produits chimiques conducteurs ou corrosifs. Veillez toujours à débrancher l'appareil de la prise murale avant le nettoyage. Pour le nettoyage, utilisez un chiffon humide.

Emplacement

ATTENTION

Veillez à ce que le produit soit toujours bien stable. Ne le faites pas tomber et ne lui infligez aucun choc puissant.

Objets pointus

ATTENTION

Objets et liquides : N'insérez jamais des objets en métal dans le produit. N'utilisez jamais ce type d'objet pour tenter d'ouvrir ou de réviser le produit. Seul un technicien qualifié est habilité à effectuer la révision du produit. Aucun liquide ne doit pénétrer dans l'appareil. Veillez à ce que l'appareil ne soit pas immergé par crainte d'électrocution.

Radiation laser

ATTENTION

Une radiation laser invisible peut être émise par l'ouverture du port quand aucun câble n'est connecté. Evitez toute exposition aux radiations laser et éviter de regarder les ouvertures. Les modules laser sont de classe I selon les normes EN60825 et FDR CFR 21(J).

Les modules laser sont définis en tant que modules laser classe I et sont conformes aux normes EN60825 et FDR CFR 21(J) DES PRODUITS LASER CLASSE 1. Ils sont conformes au dernières normes laser IEC 60 825-1:1993 + A1:1997 + A2:2001 et EN 60825-1:1994+A1:1996+ A2:2001".

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Spanish - Información de seguridad

Antes de instalar, operar o realizar tareas de mantenimiento en el sistema lea cuidadosamente la siguiente Información de seguridad.

Advertencia sobre la eliminación del producto

PRECAUCIÓN

La eliminación final del producto se hará de acuerdo con las leyes y reglamentos nacionales.

Advertencia sobre personal calificado

PRECAUCIÓN

Sólo se permitirá que personal calificado y formado instale o reemplace este equipo.

PRECAUCIÓN

Todas las tareas de mantenimiento en la unidad deben ser realizadas por un técnico calificado y capacitado. La unidad no tiene componentes cuyo servicio de mantenimiento sea realizado por el usuario.

Advertencia sobre desconexión de la alimentación

PRECAUCIÓN

El ISR 2012/2004 tiene múltiples fuentes de alimentación. Asegúrese de que todos los cables de alimentación estén desconectados antes de instalar el chasis o de llevar a cabo procedimientos que requieran acceso a su interior.

Advertencia sobre la alimentación

PRECAUCIÓN

No toque la alimentación cuando el cable esté conectado. Para sistemas con un interruptor de alimentación, hay tensiones de línea dentro de la fuente de alimentación, aunque el interruptor esté apagado y el cable conectado. Para sistemas sin un interruptor de alimentación, hay tensiones de línea dentro de la fuente de alimentación cuando el cable está conectado.

PRECAUCIÓN

No someta al producto a tensión excesiva sobre la alimentación principal: Sólo debe usarse el producto a las tensiones indicadas en el panel frontal del producto exclusivamente.

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PRECAUCIÓN

No enchufe el producto a un enchufe eléctrico sobrecargado. Esto puede causar incendio o choque eléctrico.

Cable de alimentación

PRECAUCIÓN

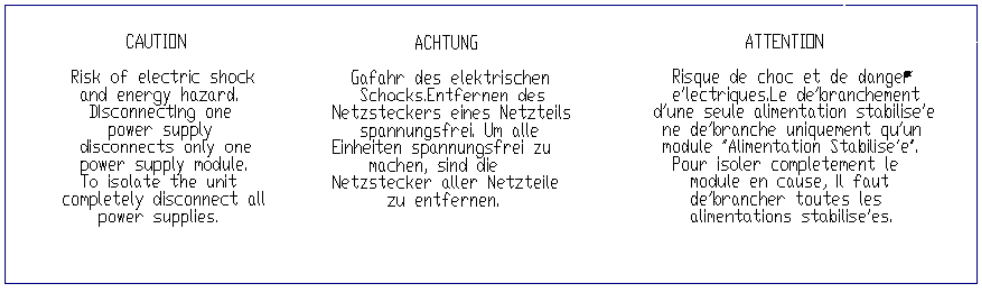
Para conexiones de alimentación en Norteamérica seleccione un cable UL y certificado CSA 3 – conductor, [18 AWG], terminado en un enchufe moldeado con tapa calificado 125 V, [15 A], con una longitud mínima de 1.5 m [seis pies] pero no más largo de 4.5 m. Para conexiones europeas seleccione un cable de alimentación armonizado internacionalmente y marcado "<HAR>", 3 - conductor, 0,75 mm2, mínimo mm2 cable, clasificado 300 V, con una camisa aislada en PVC. El cable debe tener un enchufe moldeado con tapa clasificado 250 V, 10 A.

Dispositivo de desconexión principal

PRECAUCIÓN

La combinación enchufe-toma debe ser accesible en todo momento porque actúa como el dispositivo de desconexión principal.

También se adjunta a la unidad el siguiente rotulado / marcación.


CAUTION
Risk of electric shock and energy hazard. Disconnecting one power supply disconnects only one power supply module. To isolate the unit completely disconnect all power supplies.
ACHTUNG
Gafahr des elektrischen Schocks.Entfernen des Netzsteckers eines Netzteils spannungsfrei Um alle Einheiten spannungsfrei zu machen, sind die Netzstecker aller Netzteile zu entfernen.
ATTENTION
Risque de choc et de danger e'lectriques.Le de'branchement d'une seule alimentation stabilise'e ne de'branche uniquement qu'un module 'Alimentation Stabilise'e'. Pour isoler completement le module en cause, Il faut de'brancher toutes les alimentations stabilise'es.

Advertencia sobre la conexión a tierra

PRECAUCIÓN

Cuando se instala la unidad, realice siempre la conexión a tierra primero y desconéctela en último lugar.

Advertencia sobre el equipo de conexión a tierra

PRECAUCIÓN

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Este equipo debe ser conectado a tierra. Asegúrese de que el huésped esté conectado a la tierra durante el uso normal. La unidad se conectará a una salida de alimentación conectada a tierra.

Advertencia sobre el conductor a tierra

NOTA

El **ISR 2012/2004** se entrega con una varilla a tierra. No se necesita conexión a tierra cuando se instalan menos de dos alimentaciones. Sin embargo, quizás quiera instalar una varilla a tierra en un ISR 2012/2004 para su posterior mejoramiento. Para más información consulte la sección Conexión a tierra del chasis en la página 5-3.

PRECAUCIÓN

Cuando se usen más de dos fuentes de alimentación se emite una corriente de pérdida peligrosa (corriente de tacto). Cuando se instalan más de dos fuentes de alimentación se debe conectar la unidad a tierra a través del conector de masa externo.

Los cables a usar serán los siguientes:

Unidad clasificada 28 A; 4 mm2 min.; 10 AWG;

Unidad clasificada 15 A; 1,5mm2 min.; 14 AWG

Unidad clasificada 11A: 1,25 mm2 min, 16AWG

El cable a tierra en el conector de masa será conectado antes de conectar la unidad a la alimentación principal.

PRECAUCIÓN

Nunca desconecte el conductor de masa ni opere el equipo en ausencia de un conector de masa adecuadamente instalado. Contacte la autoridad de inspección eléctrica adecuada o un electricista si no está seguro de que disponga de una conexión a tierra adecuada.

Advertencia sobre brazaletes

PRECAUCIÓN

Cuando se manipulan tarjetas electrónicas, también denominadas paneles, use brazaletes de conexión a tierra para evitar daño ESD a la tarjeta. No toque directamente el plano trasero con la mano ni con una herramienta metálica o podría sufrir un choque.

Advertencia sobre elementos

PRECAUCIÓN

Para prevenir incendios o riesgo de choque, no exponga el equipo a un ambiente de humedad y/o polvo. No use este equipo en una instalación exterior sin protección ni en un área clasificada como área húmeda.

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PRECAUCIÓN

La luz solar directa o una fuente de calor intensa, directa o del ambiente, no puede ser introducida al producto, ni por inducción ni por contacto.

PRECAUCIÓN

Proporcione ventilación adecuada para que las características térmicas no causen un aumento en la temperatura del producto que lleve a sobrecalentamiento.

PRECAUCIÓN

No limpie la unidad mediante químicos conductivos de electricidad ni corrosivos. Asegúrese de haber desenchufado la unidad del toma CA de la pared antes de proceder a la limpieza. Para la limpieza utilice exclusivamente un paño húmedo.

Advertencia sobre caja

PRECAUCIÓN

Mantenga al producto siempre sobre una base estable o segura o en una caja. No deje caer el producto ni lo someta a un impacto brusco.

Advertencia sobre objetos cortantes

PRECAUCIÓN

Ingreso de objetos y entrada de líquidos: No inserte ni empuje objetos metálicos agudos en el producto ni use dichos aparatos al intentar abrir o mantener el producto. Se debe ordenar el mantenimiento a un técnico formado y calificado exclusivamente. No permita la entrada de líquidos de ningún tipo. No permita que la unidad quede sumergida en agua ya que esto puede causar un riesgo de choque.

Advertencia sobre irradiación láser

PRECAUCIÓN

Como puede emitirse radiación láser invisible ante la apertura del puerto cuando no hay un cable conectado, evite la exposición a dicha radiación y no mire a las aperturas abiertas. Los módulos láser son láser clase I de acuerdo con EN60825 and FDR CFR 21(J).

Los módulos láser se definen como módulos láser clase I y cumplen con EN60825 y FDR CFR 21(J) PRODUCTO LÁSER CLASE 1. Se los menciona como referencia en los últimos estándares láser IEC 60 825-1:1993 + A1:1997 + A2:2001 y EN 60825-1:1994+A1:1996+ A2:2001".

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German - Sicherheitsinformationen

Bevor Sie das System installieren, betreiben oder warten, lesen Sie die Sicherheitsinformationen sorgfältig durch.

Warnung zur Produktentsorgung

VORSICHT

Die Entsorgung des Produkts sollte in Übereinstimmung mit allen nationalen Gesetzen und Vorschriften erfolgen.

Warnung zu nicht qualifiziertem Personal

VORSICHT

Die Installation oder die Auswechslung dieser Ausrüstung sollte nur durch geschultes und qualifiziertes Personal erfolgen.

VORSICHT

Alle Wartungsarbeiten am Gerät sollten von einem geschulten und qualifizierten Techniker ausgeführt werden. Innerhalb des Geräts gibt es keine wartungsfähigen Komponenten, auf die der Benutzer Zugriff hat.

Warnung zur Stromabschaltung

VORSICHT

Das ISR 2012/2004 verfügt über mehrere Stromquellen. Stellen Sie sicher, dass alle Netzstecker vor dem Installieren des Gehäuses oder vor dem Ausführen von Arbeiten, die den Zugang zum Inneren des Gehäuses erfordern, herausgezogen werden.

Warnung zum Netzteil

VORSICHT

Berühren Sie das Netzteil nicht, wenn der Netzstecker noch eingesteckt ist. Für Systeme mit einem Stromschalter gilt, dass Netzspannungen innerhalb des Netzteils vorliegen, selbst wenn der Stromschalter ausgeschaltet wurde und der Netzstecker noch eingesteckt ist. Für Systeme ohne Stromschalter gilt, dass Netzspannungen innerhalb des Netzgerätes vorliegen, wenn der Netzstecker noch eingesteckt ist.

VORSICHT

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Setzen Sie das Produkt keiner elektrischen Überspannung aus: Das Produkt darf nur mit der Nenn-Netzspannung verwendet werden, die auf der Vorderseite des Produkts angegeben ist.

VORSICHT

Schließen Sie das Produkt nicht an einer überladenen Stromsteckdose an. Dies kann zu einem Feuer oder zu elektrischem Schock führen.

Stromkabel

VORSICHT

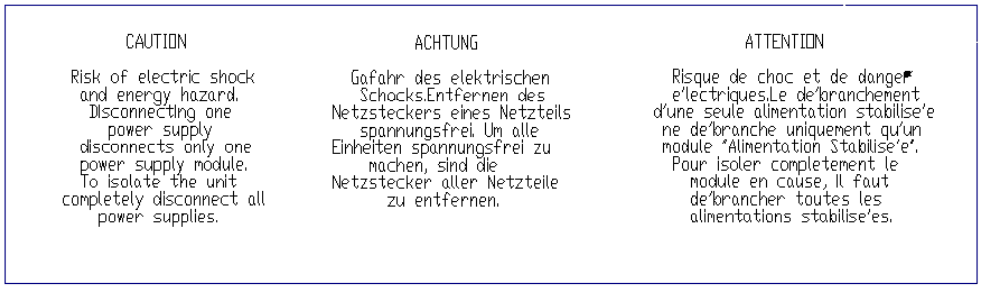
Für den Stromanschluss in Nordamerika wählen Sie das Stromkabel aus, das UL-gelistet und CSA-zertifiziert und ein 3 - Stromleiter ist, [18 AWG], endend in einer aufgegossenen Verschlusskappe, klassifiziert mit125 V, [15 A], mit einer Minimumlänge von 1,5m [sechs Fuß], aber nicht länger als 4,5m. Für europäische Anschlüsse wählen Sie das Stromkabel aus, das international abgestimmt und mit "<HAR>", 3 - Stromleiter, 0,75 mm2, Minimum mm2 Draht, klassifiziert mit 300 V, mit einem PVC-isolierten Kabelmantel, gekennzeichnet ist. Das Kabel muss mit einer aufgegossenen Verschlusskappe, klassifiziert mit 250 V, 10 A, versehen sein.

Haupttrenngerät

VORSICHT

Die Stecker-Buchsen-Kombination muss jederzeit zugänglich sein, denn sie dient als Haupttrenngerät.

Das folgende Etikett/Kennzeichnung ist ebenfalls auf dem Gerät angebracht


CAUTION
Risk of electric shock and energy hazard. Disconnecting one power supply disconnects only one power supply module. To isolate the unit completely disconnect all power supplies.
ACHTUNG
Gafahr des elektrischen Schocks.Entfernen des Netzsteckers eines Netzteils spannungsfrei. Um alle Einheiten spannungsfrei zu machen, sind die Netzstecker aller Netzteile zu entfernen.
ATTENTION
Risque de choc et de danger e'lectriques.Le de'branchement d'une seule alimentation stabilise'e ne de'branche uniquement qu'un module "Alimentation Stabilise'e". Pour isoler completement le module en cause, Il faut de'brancher toutes les alimentations stabilise'es.

Warnung zur Erdung

VORSICHT

Wenn Sie das Gerät installieren, stellen Sie stets zuerst eine Verbindung zur Erdung her und trennen Sie diese Verbindung beim Deinstallieren zuletzt.

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Warnung Geerdete Ausrüstung

VORSICHT

Diese Ausrüstung muss geerdet sein. Stellen Sie sicher, dass der Host während des normalen Gebrauchs mit der Erdung verbunden ist. Das Gerät sollte an eine geerdete Steckdose angeschlossen werden.

Warnung zur Erdungsleitung

HINWEIS

Das ISR 2012/2004 wird mit einem Erdungsbolzen-Set geliefert. Eine Erdungsverbindung ist nicht notwendig, wenn weniger als zwei Netzteile installiert werden. Sie sollten jedoch trotzdem den Erdungsbolzen an einem ISR 2012/2004 für eine nachfolgende Erweiterung installieren. Für weitere Informationen nehmen Sie bitte auf den Abschnitt Gehäuseerdung auf Seite 5-3 Bezug.

VORSICHT

Wenn Sie mehr als zwei Netzgeräte verwenden, wird ein gefährlicher Leckstrom (Berührungsstrom) emittiert. Das Gerät muss über den externen Erdungsbolzen geerdet werden, wenn mehr als zwei sPSUs installiert werden.

Kabel sollten wie folgt verwendet werden:

Gerät klassifiziert mit 28 A; 4 mm^2 min.; 10 AWG;

Gerät klassifiziert mit 15 A; 1,5 mm^2 min.; 14 AWG

Gerät klassifiziert mit 11A: 1,25 mm^2 min, 16 AWG

Der Erdungsdraht zum Erdungsbolzen muss vor dem Anschluss des Geräts an das Stromnetz angeschlossen werden.

VORSICHT

Setzen Sie den Erdungsleiter nie außer Betrieb und betreiben Sie die Ausrüstung nie ohne einen zuvor entsprechend installierten Erdungsleiter. Setzen Sie sich mit der entsprechenden Elektroinspektionsbehörde oder einem Elektriker in Verbindung, wenn Sie sich nicht sicher sind, ob eine geeignete Erdung vorhanden ist.

Warnung zur Tragschlaufe

VORSICHT

Beim Umgang mit Elektronikkarten, auch als Platinen bezeichnet, tragen Sie Erdungs-Tragschlaufen, um Schäden durch elektrostatische Entladungen an der Karte zu vermeiden. Berühren Sie die Rückwandplatine nicht direkt mit Ihrer Hand oder einem metallischen Werkzeug und Sie fügen sich selbst keinen Elektroschock zu.

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Warnung vor Naturgewalten

VORSICHT

Um Feuer- oder Elektroschock-Gefahren zu vermeiden, setzen Sie diese Ausrüstung keiner feuchten und/oder staubigen Umgebung aus. Verwenden Sie diese Ausrüstung nicht in einer ungeschützten Installation im Freien oder in einem Gebiet, das als Nassgebiet klassifiziert ist.

VORSICHT

Direkte Sonnenbestrahlung oder eine intensive Wärmequelle, direkt oder umgebend, darf nicht mit dem Produkt in Berührung kommen, weder durch Induktion noch durch Kontakt.

VORSICHT

Bieten Sie eine angemessene Belüftung an, sodass Wärmecharakteristiken nicht zu einer Erhöhung der Produkttemperatur und zu einer Überhitzung führen.

VORSICHT

Reinigen Sie das Gerät nicht unter Verwendung von elektrisch leitenden oder korrosiven Chemikalien. Stellen Sie immer sicher, dass Sie den Netzstecker des Geräts aus der Steckdose gezogen haben, bevor Sie große Reinigungsarbeiten durchführen. Verwenden Sie für das Reinigen nur ein feuchtes Tuch.

Warnung zum Gehäuse

VORSICHT

Stellen Sie das Produkt stets auf eine stabile und sichere Basis oder Gehäuse. Lassen Sie das Produkt nicht fallen und setzen Sie es keinen plötzlichen schweren Stößen aus.

Warnung vor scharfen Objekten

VORSICHT

Eindringung von Objekten und Flüssigkeiten: Schieben oder drücken Sie nie scharfe metallische Objekte in das Produkt und verwenden Sie diese Geräte nicht, um das Produkt zu öffnen oder zu warten. Die Wartung sollte nur einem geschulten und qualifizierten Techniker überlassen werden. Lassen Sie keine Flüssigkeiten aller Art in das Gerät eindringen. Lassen Sie das Gerät nicht in Wasser untertauchen, da dies eine Elektroschockgefahr darstellt.

Warnung vor Laserstrahlung

VORSICHT

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Da unsichtbare Laserstrahlung aus der Portöffnung ausgestrahlt werden kann, wenn kein Kabel angeschlossen ist, vermeiden Sie, dass Sie sich der Laserstrahlung aussetzen und starren Sie nicht in offene Öffnungen. Bei den Lasermodulen handelt es sich um Laser der Klasse I gemäß EN60825 und FDR CFR 21(J).

Die Lasermodule sind als Lasermodule der Klasse 1 definiert und sind konform mit EN60825 und FDR CFR 21(J) KLASSE 1 LASERPRODUKT. Sie sind mit einem Verweis auf die jüngsten Laserstandards IEC 60 825-1:1993 + A1:1997 + A2:2001 und EN 60825-1:1994+A1:1996+ A2:2001” versehen.

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Russian - Информация по технике безопасности

Перед началом установки, эксплуатации или обслуживания систем, внимательно прочтите указанную ниже информацию по технике безопасности.

Предупреждение относительно утилизации изделия

ВНИМАНИЕ

Окончательная утилизация данного изделия должна производиться в соответствии со всеми существующими государственными законами и предписаниями.

Предупреждение относительно использования квалифицированного персонала

ВНИМАНИЕ

Только опытный и квалифицированный персонал может быть допущен к установке или замене данного оборудования.

ВНИМАНИЕ

Обслуживание агрегата должно выполняться только грамотным и квалифицированным техническим персоналом. Агрегат не содержит легкосменные детали, подлежащие к обслуживанию пользователем.

Предупреждение относительно отключения электроснабжения

ВНИМАНИЕ

ISR 2012/2004 имеет множественные источники электропитания. Перед установкой корпуса с системным блоком или перед началом выполнения каких бы то ни было процедур, требующих доступа к внутренней части корпуса с системным блоком, удостоверьтесь, что все провода электропитания отключены.

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Предупреждение относительно электропитания

ВНИМАНИЕ

Не прикасайтесь к блоку электропитания, когда электрический шнур находится под напряжением. В системах, имеющих переключатель электропитания, линейное напряжение присутствует в источнике электропитания даже тогда, когда переключатель электропитания находится в положении ВЫКЛ., а электрический шнур находится под напряжением. В системах, не имеющих переключатель электропитания, линейное напряжение присутствует в источнике электропитания, когда электрический шнур находится под напряжением.

ВНИМАНИЕ

Не подвергайте изделие воздействию перенапряжения в электрической сети. Эксплуатируйте изделие только при параметрах напряжения питания, указанных на передней панели.

ВНИМАНИЕ

Не подключайте изделие к перегруженной электрической сети. Это может привести к пожару или электрическому удару.

Шнур электропитания

ВНИМАНИЕ

Для североамериканской электросети используйте трехжильный шнур питания, сертифицированный лабораторией по технике безопасности США (UL) и Канадской ассоциацией стандартов (CSA) [сечение 18 AWG], с литым штепселем, рассчитанным на 125 В [15 А]. Длина шнура не менее 1,5 м и не более 4,5 м. Для европейской сети используйте трехжильный шнур питания международного образца с маркировкой "<HAR>", с минимальным сечением проводов 0,75 мм2, рассчитанный на 300 В и с изоляционной защитой из ПВХ. Шнур должен быть оснащен литым штепселем, рассчитанным на 250 В, 10 А.

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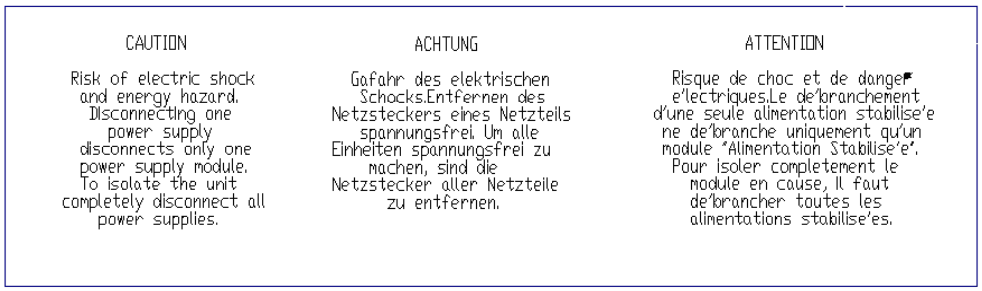
Главное разъединяющее устройство

ВНИМАНИЕ

Штепсельное соединение всегда должно быть удобно для доступа, поскольку оно служит главным разъединяющим устройством.

На агрегате имеются также следующие бирки / маркировки:



Предупреждение относительно заземляющего соединения

ВНИМАНИЕ

При установке данного агрегата, заземляющее соединение всегда следует подключать в первую очередь, а отключать – в последнюю.

Предупреждение относительно заземления оборудования

ВНИМАНИЕ

Данное оборудование должно быть заземлено. Удостоверьтесь, что во время рутинного использования хост-система заземлена. Агрегат должен быть подключен к розетке с заземляющим контактом.

Предупреждение относительно провода заземления

ПРИМЕЧАНИЕ

Данный ISR 2012/2004 поставляется в комплекте со шпилькой заземления. Соединение с землёй не является обязательным, когда установлено менее двух источников электропитания. Однако установка шпильки заземления может пригодиться вам для последующей модернизации ISR 2012/2004. Для получения дополнительной информации, см. раздел Заземление корпуса с системным блоком, страница 5-4

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ВНИМАНИЕ

При использовании более двух источников питания происходит опасная утечка тока. Если установлено более двух блоков питания, устройство необходимо заземлить через внешнюю шпильку заземления.

При этом следует использовать следующие провода:

для устройства, рассчитанного на 28 А – сечение минимум 4 мм2, 10 AWG;

для устройства, рассчитанного на 15А – сечение минимум 1,5 мм2, 14 AWG

для устройства, рассчитанного на 11А – сечение минимум 1,25 мм2, 16 AWG.

Провод, соединяющий изделие со шпилькой заземления, следует подключить ДО подключения изделия к источнику питания.

ВНИМАНИЕ

Никогда не отсоединяйте провод заземления и не эксплуатируйте оборудование без подключенного провода заземления. Если вы не уверены, что оборудование надлежащим образом заземлено, обратитесь к квалифицированному электрику или в инстанции, контролирующие безопасность электрического оборудования.

Предупреждение относительно контактных манжеток

ВНИМАНИЕ

При обращении с электронными платами следует надевать контактные манжетки во избежание нанесения ущерба платам вследствие электростатических разрядов. Избегайте прямого контакта рук или любых металлических инструментов с задней объединительной панелью - это может привести к электрическому удару.

Предупреждение относительно элементов конструкции

ВНИМАНИЕ

Для предотвращения возникновения пожара или опасности поражения электротоком, не подвергайте данное оборудование воздействию влаги и/или пыли. Не используйте данное оборудование в незащищенных наружных установках или любых иных местах, относящихся к зонам повышенной влажности.

ВНИМАНИЕ

Запрещается подвергать продукт контактному или индуцированному воздействию прямых сонечных лучей или интенсивных источников тепла, напрямую или от окружающей среды.

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ВНИМАНИЕ

Следует обеспечить требуемую вентиляцию помещения с тем, чтобы теплофизические характеристики не привели к повышению температуры и последующему перегреву изделия.

ВНИМАНИЕ

При чистке агрегата не используйте токопроводящие или коррозионно-активные химикаты. Перед началом основательной чистки всегда отключайте агрегат от сети переменного тока. Для чистки следует использовать только лишь влажное тканевое полотенце.

Предупреждение относительно установки изделия

ВНИМАНИЕ

Всегда устанавливайте изделие только на устойчивую и надежную подставку или поверхность. Не роняйте изделие и не допускайте его резкого сотрясения.

Предупреждение относительно острых предметов

ВНИМАНИЕ

Проникновение посторонних предметов и жидкости: Никогда не вставляйте острые металлические предметы вовнутрь изделия, а также не используйте подобные инструменты для попытки вскрытия или обслуживания данного изделия. Обслуживание изделия должно осуществляться только лишь опытным и квалифицированным персоналом. Предотвращайте попадание в изделие жидкости любого рода. Не погружайте изделие в воду – это может привести к опасности поражения электротоком.

Предупреждение относительно лазерного излучения

ВНИМАНИЕ

Поскольку в случае, если кабель не подсоединен к порту, из отверстия порта может исходить невидимое лазерное излучение, старайтесь избегать воздействия такого излучения - в частности, не смотрите длительное время в открытые отверстия портов. В соответствии со стандартами EN60825 (Европейское Сообщество) и FDR CFR 21(J) (США) лазерные модули относятся к классу 1.

Лазерные модули определяются как лазерные модули класса 1 и соответствуют стандартам EN60825 (EC) и FDR CFR 21(J) (США) в качестве ЛАЗЕРНОГО ОБОРУДОВАНИЯ КЛАССА 1. Модули разработаны в соответствии с наиболее современными стандартами в отношении лазерного оборудования: IEC 60 825-1:1993 + A1:1997 + A2:2001 and EN 60825-1:1994+A1:1996+ A2:2001".

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Simplified Chinese - 安全事项

请在安装、运行、维护本系统之前，仔细阅读以下安全事项。

产品废弃警示

警告

最终废弃本产品时，须遵循本国所有法律、法规。

从业人员警示

警告

只有经过培训并具有相应资格的人员方可对此设备进行安装或更换。

警告

产品维护人员须经过培训并获得相应技术资格，应对产品进行全部维护操作。用户无权对产品内部器件进行维护。

断电警示

警告

ISR 2012/2004 具有多种电源供应方式。在安装底盘或要对底盘内部进行操作之前，务必确定所有电源线都已断开。

电源警示

警告

电源线接通后，切勿触摸电源。带电源开关的系统，当电源线接通时，即使开关是断开的，其电源内部仍会带有火线电压。不带电源开关的系统，当电源线接通时，其电源内部即有火线电压。

警告

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切勿将本产品连接到电压过高的电源上：本产品必须在额定电压下使用，产品正面有唯一的额定电压数值标示。

警告

切勿将本产品插到过载的电源接口上，否则可能会造成失火或触电事故。

电源线

警告

在北美洲，请使用带 UL 及 CSA 认证的三芯电源线[18 AWG]，成型插脚头 125 V [15 A]，线长最短 1.5m（6 英尺），但不得超过 4.5m。在欧洲，请使用符合国际协调标准并印有“<HAR>”字样的电源线，三芯，0.75 mm2，至少 mm2，300V，带 PVC 绝缘座。电源线必须带有 250 V、10 A 成型插脚头。

断电装置

警告

任何时候，作为断电装置的电源插头、插座必须置于一个容易操作的位置，以便随时切断电源。

产品上贴有以下标签/标示

CAUTION	ACHTUNG	ATTENTION
Risk of electric shock and energy hazard. Disconnecting one power supply disconnects only one power supply module. To isolate the unit completely disconnect all power supplies.	Gafahr des elektrischen Schocks.Entfernen des Netzsteckers eines Netzteils spannungsfrei. Um alle Einheiten spannungsfrei zu machen, sind die Netzstecker aller Netzteile zu entfernen.	Risque de choc et de danger e'lectriques.Le de'branchement d'une seule alimentation stabilise'e ne de'branche uniquement qu'un module "Alimentation Stabilise'e". Pour isoler completement le module en cause, Il faut de'brancher toutes les alimentations stabilise'es.

接地警示

警告

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安装产品时，请先做好接地，等所有操作完成之后再断开接地。

接地设备警示

警告

此设备必须接地。正常使用时，请确保主机良好接地。产品所连接的电源须带地线。

接地导线警示

说明

ISR 2012/2004 配有一套接地螺栓。如果电源只使用了不到两个，则没有必要接地。不过，为了将来升级的需要，您还是可以将接地螺栓装到 ISR 2012/2004 上。详细信息，请参见第 5-3 页上的底盘接地部分。

警告

如果电源使用超过两个，就会产生泄漏电流（接触电流）的危险。如果安装了两个以上电源，产品必须通过外部接地螺栓接地。

接线须按如下要求进行：

28A 产品：4 mm^2 min.; 10 AWG;

15A 产品：1,5 mm^2 min.; 14 AWG;

11A 产品：1.25 mm^2 min, 16AWG

接线时，必须首先将地线接到地线螺栓上，然后再电源线接好。

警告

切勿毁损地线螺栓，或在接线螺栓没有安装好的情况下使用设备。如果您不确定设备是否正确接地，请联系电路检修部门或电工。

防静电环警示

警告

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在对电子卡、板等进行操作时，请佩戴防静电环，而且还要接地，以避免静电对卡板造成危害。切勿徒手或使用金属工具直接接触后面板，以免触电。

环境警示

警告

为避免失火或触电事故，请勿将此设备放置在潮湿及/或多尘的环境下。请勿在户外无保护措施的安装条件下或在被认定为潮湿的场所使用此设备。

警告

切勿将产品置于阳光直射或高热环境下，避免传导或接触高热物体。

警告

请保持良好通风，以免产品出现过热现象。

警告

请勿使用导体或具有腐蚀性的化学物质清洁产品。在进行任何较大的清理工作前，一定要先将产品的电源线从墙上拔下。只能使用湿布擦拭。

护栏警示

警告

一定要将产品放置在牢固可靠的基座或护栏中。不得摔碰产品，亦不得将产品放置在可能遭受严重碰撞的地方。

锐物警示

警告

有异物或液体进入产品时，切勿使用尖锐的金属物插入产品内，切勿使用此类物品去打开或维修产品。产品维护只能由经过培训并获得相关资格的技术人员进行。切勿让任何形式的液体进入产品内。切勿将产品浸入水中，以免触电。

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激光辐射警示

警告

当没有连线时，端口处的小孔也可能会射出看不见的激光；请注意避免被激光射中，切不可直视打开的发光孔。激光模组是符合 EN60825 及 FDR CFR 21(J)的一级激光。

激光模组是符合 EN60825 及 FDR CFR 21(J)的一级激光产品，符合最新颁布的激光标准 IEC 60 825-1:1993 + A1:1997 + A2:2001 and EN 60825-1:1994+A1:1996+ A2:2001”.

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Korean - 안전 정보

시스템을 설치, 조작 또는 수리하기 전에 다음 안전 정보를 숙지하십시오.

제품 폐기 경고

주의

본 제품은 현지 법률 및 규정에 따라 최종적으로 폐기해야 합니다.

유자격 기술자 경고

주의

교육을 받은 유자격 기술자만 본 장치를 설치하거나 교체할 수 있습니다.

주의

본 장치는 교육을 받은 유자격 기술자만 수리할 수 있습니다. 본 장치에는 사용자가 직접 수리할 수 있는 부품이 없습니다.

전원 분리 경고

주의

ISR 2012/2004 에는 전원이 여러 개 있습니다. 섀시를 설치하기 전이나 섀시 내부에 접근해야 하는 절차를 수행하기 전에 모든 전원 케이블이 분리되어 있는지 확인하십시오.

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전원 공급장치 경고

주의

전원 코드가 연결되어 있는 상태에서 전원 공급장치를 만지지 마십시오. 전원 스위치가 있는 시스템의 경우, 전원 스위치을 끄더라도 전원 코드가 연결되어 있으면 전원 공급장치 내부에 선간 전압이 있습니다. 전원 스위치가 없는 시스템의 경우 전원 코드가 연결되어 있으면 전원 공급장치 내부에 선간 전압이 있습니다.

주의

본 제품의 메인 전원에 과전압이 걸리지 않도록 하십시오. 본 제품은 전면 패널에 표시된 정격 공급 전압에서만 사용해야 합니다.

주의

본 제품을 과부하가 걸린 전기 콘센트에 연결하지 마십시오. 화재가 발생하거나 감전될 수 있습니다.

전원 코드

주의

북미에서 전원을 연결하려면. 정격 전압 및 전류가 각각 125V, [15A]인 성형 플러그 캡으로 종단 처리된 길이가 1.5m[6 피트] 이상, 4.5m 미만인 UL 인증(UL Listed) 및 CSA 인증(CSA Certified)을 받은 3 도선[18 AWG]인 전원 코드를 사용하십시오. 유럽에서 전원을 연결하려면, 유럽 통일 규격을 준수하고 "<HAR>" 마크를 획득한 PVC 절연 피복을 입힌 정격 전압 300V 에 0.75mm2(최소 mm2) 전선의 3 도체 전원 코드를 사용하십시오. 전원 코드에는 정격 전압 및 전류가 각각 250V, 10A 인 성형 플러그 캡이 있어야 합니다.

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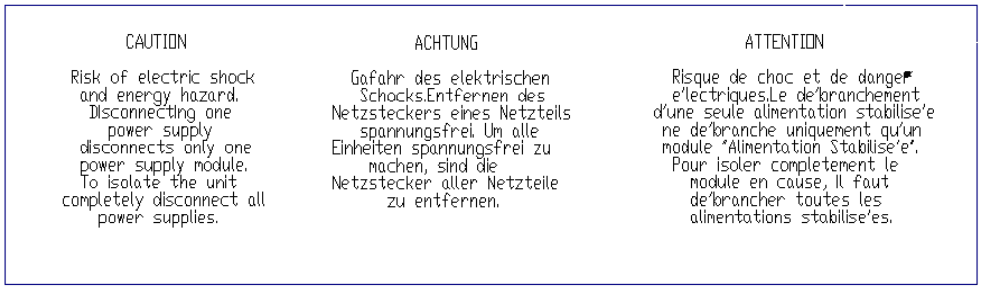
메인 분리 장치

주의

플러그-소켓 조합은 메인 분리 장치의 역할을 하기 때문에 언제나 접근 가능해야 합니다.

또한 다음 라벨/표시가 장치에 부착되어 있어야 합니다.



접지 연결 경고

주의

장치를 설치할 때는 언제나 접지를 가장 먼저 연결하고 가장 나중에 분리하십시오.

접지된 장치 경고

주의

본 장치는 접지해야 합니다. 정상적인 사용 시 호스트가 반드시 접지에 연결되어 있어야 합니다. 본 장치는 접지된 메인 전원 콘센트에 연결해야 합니다.

접지 도선 경고

참고

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ISR 2012/2004 는 접지 스터드 키트와 함께 제공됩니다. 두 개 미만의 전원 공급장치를 설치할 때는 접지 연결이 필요하지 않습니다. 그러나 향후 업그레이드를 위해 ISR 2012/2004 에 접지 스터드를 설치할 수 있습니다. 자세한 내용은 5-3 페이지의 섀시 접지 절을 참조하십시오.

주의

세 개 이상의 전원 공급장치를 사용하는 경우 위험한 누설 전류(접촉 전류)가 방출됩니다. 본 장치는 세 개 이상의 전원 공급장치가 설치되어 있는 경우 외장형 접지 스터드를 통해 접지해어야 합니다.

다음 전선을 사용해어야 합니다.

단위 정격 전류 28A, 최소 4 mm^2 , 10 AWG

단위 정격 전류 15A, 최소 1,5 mm^2 , 14 AWG

단위 정격 전류 11A, 최소 1.25 mm^2, 16AWG

장치를 메인 전원에 연결하기 전에 접지 스터드에 연결되는 접지선을 먼저 연결해야 합니다.

주의

접지 도선을 차단하지 마십시오. 또한 적절하게 설치된 접지 도선이 없는 경우 장치를 조작하지 마십시오. 적절한 접지가 설치되었는지 직접 확인할 수 없는 경우, 해당 전기 검사 당국 또는 기술자에게 문의하십시오.

손목 띠 경고

주의

보드라고도 부르는 전자 카드를 취급할 때는 접지 손목 띠를 착용하여 ESD 로 인해 카드가 손상되는 것을 방지하십시오. 후면판을 손으로 직접 만지거나 후면판에 금속 도구를 직접 대지 마십시오. 감전될 수도 있습니다.

소자 경고

주의

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화재나 감전 위험을 방지하려면 본 장치를 습하거나 먼지가 있는 환경에 노출시키지 마십시오. 보호 장치가 없는 야외 시설 또는 습한 구역으로 분류되는 장소에서 본 장치를 사용하지 마십시오.

주의

유도나 접촉에 의해서 직사광선 또는 직접적이거나 주변의 강력한 열원이 장치에 유입되어서는 안 됩니다.

주의

열 특성으로 인해 제품 온도가 상승하여 과열되지 않도록 적절한 통풍을 제공하십시오.

주의

전도성 또는 부식성 화학물질을 사용하여 장치를 닦지 마십시오. 청소를 하기 전에 반드시 벽면의 AC 전원 콘센트에서 장치의 전원 코드를 분리하십시오. 젖은 천은 청소할 때만 사용하십시오.

인클로저 경고

주의

장치는 반드시 안정되고 안전한 받침대나 인클로저에 올려 놓으십시오. 장치를 떨어뜨리지 마십시오. 또한 장치에 갑자기 무거운 충격이 가해지지 않도록 주의하십시오.

날카로운 물체 경고

주의

물체 삽입과 액체 주입: 장치에 날카로운 금속 물체를 삽입하거나 밀어 넣지 마십시오. 또한 이러한 도구들을 사용하여 장치를 열거나 수리하지 마십시오. 교육을 받은 유자격 기술자에게만 수리를 의뢰해야 합니다. 어떤 종류의 액체도 장치에 들어가지 않도록 주의하십시오. 장치를 물에 빠뜨리지 마십시오. 감전될 위험이 있습니다.

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레이저 방사 경고

주의

케이블이 연결되어 있지 않더라도 비가시 레이저 방사선이 포트의 개구부에서 방출될 수 있으므로, 레이저 방사에 노출되지 않도록 주의하십시오. 또한 열린 개구부를 들여다보지 마십시오. EN60825 와 FDR CFR 21(J)에 의하면, 레이저 모듈은 클래스 I 레이저로 분류됩니다.

레이저 모듈은 클래스 I 레이저 모듈로 정의되어 있으며 EN60825 및 FDR CFR 21(J) 클래스 1 레이저 제품(CLASS 1 LASER PRODUCT) 규격을 준수합니다. 레이저 모듈은 최근의 레이저 규격 IEC 60 825-1:1993 + A1:1997 + A2:2001, EN 60825-1:1994+A1:1996+ A2:2001 에 기초해 제작되었습니다.

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Japanese - 安全情報

システムの取り付け、操作、修理の前に、次の安全情報をよくお読みください。

製品の廃棄について

注意

本製品を廃棄する場合は、お住まいの国の法律と規制に従ってください。

有資格の担当者について

注意

本装置を取り付けたり交換できるのは、訓練を受けた資格のある担当者だけです。

注意

ユニットの修理はすべて、訓練を受けた資格のある技師が行ないます。ユニットのユーザーがアクセスできる範囲内には修理できるコンポーネントはありません。

電源の接続を外す場合

注意

ISR 2012/2004 には複数の電源ソースがあります。シャーシを取り付ける前や、シャーシの内部での作業を必要とする場合にはその前に、すべての電源ケーブルの接続を外してください。

電源供給について

注意

電源コードが接続されている場合は、電源供給に触れないでください。電源スイッチのあるシステムでは、電源スイッチがオフで、電源コードが接続されている場合は、電源供給内にライン電圧があります。電源スイッチのないシステムでも、電源コードが接続されている場合は、電源供給内にライン電圧があります。

注意

本製品を許容電圧を超える電源に接続しないでください。製品は、製品のフロントパネルに記載されている定格供給電圧でのみお使いください。

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注意

製品は、たこ足配線など電気の安全許容量を超える可能性のある電気コンセントには絶対に接続しないでください。火災や感電の恐れがあり危険です。

電源供給コード

注意

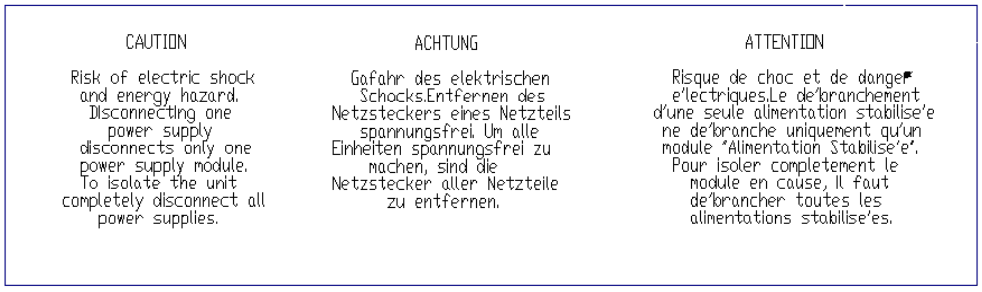
北米の電源接続では、次の電源供給コードをお選びください。UL 承認および CSA 規格 3 – 導体、[18 AWG]、125 V 定格の鋳造プラグキャップ付き、[15 A]、長さ 1.5m [6 feet] 以上 4.5m 未満。 欧州での接続では、次の電源供給コードをお選びください。国際調和された "<HAR>" マークのあるもの、3 – 導体、0.75 mm2、最小 mm2 ワイヤ、定格 300 V、PVC 絶縁ジャケット付き。定格 250 V、10 A の鋳造プラグキャップのあるコードを使います。

接続を外す場合のメインデバイス

注意

プラグとソケットの組み合わせは、接続を外す場合のメインデバイスとして機能します。そのため、いつでもアクセスできる状態にします。

ユニットには次のラベル/注意書きも添付されています。



接地接続について

注意

ユニットを取り付ける場合は、接地を最初に接続します。接続を外す場合は、接地接続を最後に外します。

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装置の接地について

注意

本装置は必ず接地してください。通常の使用の際には、ホストが接地に接続されていることを確認します。ユニットは、接地された電源コンセントに接続します。

接地導体について

メモ

ISR 2012/2004 には接地スタッドキットが付属しています。取り付ける電源供給が 2 つ未満の場合は接地接続は不要です。ただし、後でアップグレードする場合は、ISR 2012/2004 に接地スタッドを取り付ける必要があります。詳細情報。詳細情報については、5-3 ページにある「シャーシ接地セクション」を参照してください。

注意

2 つ以上の電源供給を使う場合は、危険な漏洩電流（接触電流）が発生します。2 つ以上の電源供給を取り付ける場合は、外部接地スタッドを使ってユニットを接地してください。

使用するワイヤについては次を参照してください:

ユニット 定格 28 A、4 mm^2 最小、10 AWG

ユニット 定格 15 A、1,5 mm^2 最小 14 AWG

ユニット 定格 11A、1.25 mm^2 最小、16AWG

接地ワイヤを接地スタッドに接続してから、ユニットを電源に接続します。

注意

接地導体を無効にしたり、接地導体を適切に取り付けずに装置を操作しないでください。適切な接地 について不明点がある場合は、電機検査機関または電気技師までお問い合わせください。

リストストラップについて

注意

電子カード（またはボードとも呼ばれますが）を取り扱う場合は、接地 リストストラップを使用すると、静電気放電によってカードの破損することを防止します。バックプレーンに手や金属製の工具で直接触れないでください。感電することがあります。

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使用環境とお手入れについて

注意

火災や感電を防止するために、本装置を湿度の高い場所や埃の多い場所に置かないでください。本装置は、保護されていない状態で屋外で使用したり、濡れた場所で使用しないでください。

注意

製品は、直射日光の当たる場所や、直接または間接的に熱を発するものの近くに置かないでください。

注意

十分に通気して、温度特性が原因で製品が過熱しないようにします。

注意

ユニットのお手入れの際には、電導性や腐食性のある化学薬品は使わないでください。お手入れの前には、必ずユニットの接続を AC 壁電源コンセントから外してください。お手入れの際には、湿らせた布だけを使います。

筐体について

注意

製品は安定したベースや筐体の上に置きます。製品を落したり激しくぶつけたりしないでください。

異物や液体について

注意

異物と液体の侵入：尖った金属製のものを製品の中に差し込んだり、尖った金属製のデバイスを使って製品を開けたり修理しないでください。修理は必ず行訓練を受けた資格のある技師に依頼します。ユニットの中に液体が入らないようにしてください。ユニットを水に漬けないでください。感電する恐れがあり、危険です。

レーザー放射について

注意

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ケーブルを接続すると、装置のポートから目に見えないレーザーが放射されることがあります。安全のために、開いた装置の中を直視しないでください。レーザーモジュールは、EN60825 および FDR CFR 21(J) に準拠するクラス I レーザーです。

レーザーモジュールはクラス I レーザーモジュールとして分類され、EN60825 および FDR CFR 21(J) **クラス** 1 **レーザー製品**に適合します。これらは最新のレーザー基準 IEC 60 825-1:1993 + A1:1997 + A2:2001 および EN 60825-1:1994+A1:1996+ A2:2001” に基づくものです。

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EMC Information

Electronic Emission Notices Federal Communications Commission (FCC) Statement

CAUTION

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Voltaire is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Industry Canada Class A Emission Compliance Statement

CAUTION

This Class A digital apparatus complies with Canadian ICES-003.

Avis de Conformité aux Normes d'Industrie Canada

CAUTION

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

European Union (EU) Mark of Conformity Statement

CAUTION

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This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

Warning: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Properly shielded and grounded cables and connectors must be used in order to reduce the potential for causing interference to radio and TV communications and to other electrical or electronic equipment. Such cables and connectors are available from Voltaire authorized dealers. Voltaire cannot accept responsibility for any interference caused by using other than recommended cables and connectors.

Germany

CAUTION

Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) vom 30. August 1995 (bzw. der EMC EG Richlinie 89/336).

Dieses Gerät ist berechtigt in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen.

Verantwortlich für die Konformitätserklärung nach Paragraph 5 des EMVG ist die Voltaire Deutschland Informationssysteme GmbH, 70548 Stuttgart.

Informationen in Hinsicht EMVG Paragraph 3 Abs. (2) 2:

Das Gerät erfüllt die Schutzanforderungen nach EN 50082–1 und EN 55022 Klasse A.

EN 55022 Klasse A Geräte müssen mit folgendem Warnhinweis versehen werden:

"Warnung: dies ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funkstörungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen durchzuführen und dafür aufzukommen."

EN 50082–1 Hinweis:

"Wird dieses Gerät in einer industriellen Umgebung betrieben (wie in EN 50082–2 festgelegt), dann kann es dabei eventuell gestört werden. In solch einem Fall ist der Abstand bzw. die Abschirmung zu der industriellen Störquelle zu vergrößern."
Anmerkung:

Um die Einhaltung des EMVG sicherzustellen sind die Geräte, wie in den Voltaire Handbüchern angegeben, zu installieren und zu betreiben.

Australia / New Zealand

CAUTION

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This is a Class A product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

Australian C-tick Label:

Japanese Power Line Harmonics Compliance Statement

高調波ガイドライン適合品

高調波ガイドライン適合品

Japanese Voluntary Control Council for Interference (VCCI) Statement

CAUTION

This product is a Class A Information Technology Equipment and conforms to the standards set by the Voluntary Control Council for Interference by Technology Equipment (VCCI). In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

MIC-Korea Certification

The Voltaire products comply with the Korean MIC regulations.

NOTE

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Please note that this device has been approved for business purposes with regard to electromagnetic interference. If you find this is not suitable for your use, you may exchange it for a non-business purpose one.

A급 기기(업무용)

이 기기는 업무용으로 전자파적합등록을 받은 기기이오니
판매자 또는 이용자는 이점을 주의하시기 바라며, 만약
구입하였을 때에는 구입한 곳에서 가정용으로 교환하시기
바랍니다.

Chinese Class A Warning Statement

CAUTION

This is a Class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

中华人民共和国“A类”警告声明

声 明

此为 A 级产品，在生活环境中，该产品可能会造成无线电干扰。在这种情况下，可能需要用户对其干扰采取切实可行的措施。

BSMI (Taiwan) Class A Warning Statement

CAUTION

This product fully complies with CNS 13438 (CISPR 22: 1993) Class A.

警告使用者:
這是甲類的資訊產品，在
居住的環境中使用時，可
能會造成射頻干擾，在這
種情況下，使用者會被要
求採取某些適當的對策。

Electrostatic Discharge (ESD)

CAUTION

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ESD damage can occur when there is a difference in charge between the part, the product, and the service person. No damage will occur if the service person and the part being installed are at the same charge level.

ESD Damage Prevention

Anytime a service action involves physical contact with logic cards, modules, back-panel pins, or other ESD sensitive (ESDS) parts, the service person must be connected to an ESD common ground point on the product through the ESD wrist strap and cord.

The ESD ground clip can be attached to any frame ground, ground braid, green wire ground, or the round ground prong on the AC power plug. Coax or connector outside shells can also be used.

Handling Removed Cards

Logic cards removed from a product should be placed in ESD protective containers. No other object should be allowed inside the ESD container with the logic card. Attach tags or reports that must accompany the card to the outside of the container.

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This Manual describes installation of the Voltaire ISR 2012 and the ISR 2004 Grid Directors, including unpacking, installation, rack mounting and configuration. It also includes product specifications and troubleshooting information.

Audience

This guide is primarily intended for system administrators who are authorized to install Voltaire's Grid Director family.

It is assumed that readers are familiar with InfiniBand technology and terminology.

Document Conventions

NOTE

Text set off in this manner presents clarifying information, specific instructions, commentary, sidelights, or interesting points of information.

IMPORTANT

Text set off in this manner indicates important information regarding a specific feature.

CAUTION

Text set off in this manner indicates that failure to follow directions could result in damage to equipment or loss of information.

Voltaire-Specific Terms & Acronyms

The following is a non-exhaustive list of Voltaire-specific terms and acronyms frequently used throughout this document. Refer to Appendix B for a more comprehensive list.

Term/Acronym	Description
Clos Topology	Non-blocking hierarchical switching fabric architecture
FRU	Field-Replaceable Unit
IB	InfiniBand
IPR	TCP/IP Router
ISR	InfiniBand Switch Router (Grid Director/Grid Switch)
ISR 2012/2004	Common features of the ISR 2012 and the ISR 2004 Grid Directors
Mgt	Management
sCTRL	Control board
sFB	Fabric Board
sFB-2004	DDR Fabric Board for the Grid Director ISR 2004
sFB-2012	DDR Fabric Board for the Grid Director ISR 2012
sFU	Fan Unit
sFU-2004	Vertical Fan Unit for the Grid Director ISR 2004
sFU-4	Vertical Fan Unit for the Grid Director ISR 2012
sFU-8	Horizontal Fan Unit for the Grid Director ISR 2012/2004
sLB	Line Board
sLB-2024	DDR Line Board for the Grid Director ISR 2012/2004
sMB	Management Board
sMB-HM	High Memory Management Board
sPSU	Power Supply Unit

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Term/Acronym	Description
VDM	GridVision Device Manager
VFM	GridVision Fabric Manager
GridVision	Voltaire Management Suite
sRBD-20	Router Blade Drawer for the ISR 2012/2004 (including 2 IPRs)
sRB-20210G	10GbE module for the ISR 2012/2004

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Document Organization

- **Chapter 1 – Product Overview:** Describes the Voltaire ISR 2012/2004 chassis and its system boards.
- **Chapter 2 – System Configurations:** Provides a detail of the Voltaire ISR 2012/2004 Grid Director System configurations
- **Chapter 3 – ISR 2012/2004 Specifications:** provides in detail the Voltaire ISR 2012/2004 Grid Director System Specifications.
- **Chapter 4 – Packing and Unpacking:** Describes how to safely unpack the Voltaire ISR 2012/2004 after shipping, and the modules and accessories with which it arrives.
- **Chapter 5 – Hardware Installation:** Describes how to prepare your site for installation, how to prepare and install the ISR 2012/2004, how to connect network cables, and how to connect the power.
- **Chapter 6 – Installing System Boards:** describes installation of the system boards in the Voltaire ISR 2012/2004 chassis.
- **Chapter 7 – Installing Cables - Chassis Ports Physical Configuration** provides the software ports physical configuration according to the preferred cables and instructions on how to update the physical ports.
- **Chapter 8 – Verifying Installation:** describes how to verify that the ISR is correctly operating once installation has been completed.
- **Chapter 9 – System Cabling:** Presents instructions and guidelines for preparing the ISR 2012/2004 cabling connections.
- **Appendix A** – **Troubleshooting:** provides troubleshooting procedures for problems encountered during installation.
- **Appendix B – Definitions & Acronyms**
- **Appendix C – Index**

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Related Documentation

In addition to this guide, the following product documentation is available:

- GridVision Integrated User Documentation Suite (P/N 399Z00038)
- Getting Started Short Guide-Voltaire Solution for the ISR 9XXX ISR 2012_2004 (399Z00021)
- Voltaire sRB-20210G [10GbE] User Manual [DOC-00288]
- Voltaire IPR User Manual [399Z00005]
- Voltaire Statement of Volatility (P/N 399Z00080)

NOTE

Please remember to review all product release notes for known issues and limitations

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Chapter 1. Product Overview

In this Chapter

This chapter provides a description of the Voltaire ISR 2012/2004 chassis and its system boards.

This chapter contains the following sections:

1.1 Voltaire ISR 2012/2004 Description 1-2
1.2 Major Features 1-8
1.3 Product Architecture 1-8

1.1 Voltaire ISR 2012/2004 Description

1.1.1 Grid Director Overview

The Voltaire Grid Director multi-service switch enables high performance applications to run on distributed server, storage and network resources. Multiple Grid Directors can be interconnected to form very large scalable high performance clusters and grids that can grow into the thousands of nodes.

The Grid Director ISR 2012/2004 is Voltaire's second generation director class 20 Gbps InfiniBand switch. The industry-leading design of the Grid Director ISR 2012/2004 provides reliable packet delivery increasing application efficiency. With its excellent signal integrity, the Grid Director ISR 2012/2004 supports copper InfiniBand cables up to 14m and optical InfiniBand cables up to 100m extending the reach of high performance computing systems and increasing data center scalability.

The ISR 2012/2004 has Built-in Reliability, Availability and Supportability (RAS). All critical components including power supplies, fans and management controllers have built-in redundancy ensuring maximum system up time and supportability.

Redundant management boards maintain synchronization so that a failure can be recovered without the loss of management information or any disruption in communication.

The Grid Director provides comprehensive and powerful management capabilities through GridVision™ InfiniBand Fabric Management Software.

1.1.2 ISR 2012 Overview

The Voltaire Grid Director ISR 2012 delivers up to 288 ports 20 gigabits per second InfiniBand connectivity. Low latencies of 11.52 terabits per second non-blocking backplane eliminate communication bottlenecks, allowing applications to perform at maximum efficiency. As the industry's largest multi-service switching solution, the Grid Director ISR 2012 provides unprecedented levels of performance and scalability for large, high performance computing environments and grids.

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Figure 1-1. 2012 Grid Director – Front

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Figure 1-2. 2012 Grid Director – Rear

1.1.3 ISR 2004 Overview

The Voltaire Grid Director ISR 2004 with up to 96 ports of 20 gigabits per second InfiniBand connectivity delivers 3.84 terabits per second of reliable non-blocking backplane bandwidth to eliminate communication bottlenecks and allow applications to perform at maximum efficiency.

The ISR 2004 is a 4-slot, 19" rack mountable chassis, 6U height, configurable with up to four redundant Power Supplies (sPSUs), Router Blades (sRBs), a horizontal Fan Unit (sFU) and a vertical Fan Unit (sFU-8).

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Figure 1-3. ISR 2004 Chassis Grid Director – Front

Figure 1-4. ISR 2004 Chassis Grid Director – Rear

1.1.4 Unmatched Performance

The Grid Director ISR 2012/2004 leads the InfiniBand industry with the highest switching capacity. It features a FAT Tree (Clos) topology that provides full bisectional bandwidth for each port.

Providing unmatched levels of InfiniBand bandwidth, the ISR 2012 and the ISR 2004 Grid Directors respectively support up to 288 and 96 InfiniBand 20 Gb/s 4X ports and 10GbE ports, which can be used in any combination.

Wire-speed non-blocking switch capacity combined with latency of less than 420 nanoseconds make the Grid Director ISR 2012/2004 the highest performing switch available.

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1.1.5 Multi-protocol Connectivity

The ISR 2012/2004 supports the use of high performance I/O modules providing seamless connectivity between server clusters, FC SANs, NAS appliances, IP SANs and TCP/IP networks (LANs).

InfiniBand, 1GbE, and 10GbE ports can be mixed and matched in a single chassis, allowing users to configure systems to exact requirements.

1.1.6 Double Data Rate (DDR)

NOTE

Note that 20 Gbps and DDR are equivalent and are used interchangeably. However, most of the document refers to 20 Gbps.

The Grid Director™ ISR 2012/2004 platform leverages the Double Data Rate (DDR) InfiniBand standard via the following DDR fabric and line modules:

- sLB-2024 Line Board
- sFB-2012 Fabric Board
- sFB-2004 Fabric Board
- sRB-20210G (10GbE) Board

1.1.7 Comprehensive Management

The Grid Director ISR 2012/2004 provides comprehensive and powerful management capabilities through the GridVision™ InfiniBand Management Software, which includes the embedded GridVision™ Device Management (VDM) and Fabric Management (VFM) software. The management capabilities are hosted in the switch independent of any external management platform and can be accessed via CLI, GUI or SNMP managers.

GridVision delivers real-time proactive management by providing:

- Aggregated fabric and resource views
- A suite of fabric and switch diagnostics
- Fail-over management on all levels
- Provisioning of InfiniBand fabrics and the attached server, networking, and storage resources

Also available for use with Voltaire solutions is the Voltaire GridStack™ High Performance InfiniBand Protocol Stack, a production-ready version of the open source OFED stack available through the OpenFabrics Alliance. GridStack is optimized for both application performance and supportability with advanced tools for deploying and troubleshooting.

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1.1.8 Management Redundancy Mechanism

The ISR 2012/2004 supports redundant High-Memory Management Boards (sMBs). The master sMB serves as the active system manager while the other is a standby management board. The latter takes control when it detects a failure of the active sMB. Failure can be caused by the Subnet Manager, or removal or failure of sMB or the sFB adjacent to the sMB. The redundancy mechanism maintains consistent replications of the system configuration parameters on both sMB modules.

NOTE

Throughout this manual, the High-Memory Management Board shall be referred to as sMB.

1.1.9 High-Availability

All of the Grid Director ISR 2012/2004 product components are hot-swappable to allow for the highest availability. Power supplies, as well as fans provide system high availability and serviceability. Redundant management blades maintain synchronization so that a failure can be recovered without the loss of management information or any disruption in port-to-port communication.

1.1.10 Clos Topology – Bisectional Bandwidth

A Clos network is a switch topology in which integrated non-blocking switch elements (crossbars) with a relatively low number of ports are used to build a non-blocking switch topology supporting a much larger number of endpoints.

In order to provide large port counts using 24-port switch ASICs, Voltaire's ISR 2012/2004 Director Switches contain 3-tier non-blocking Clos networks. The edge (leaf) switches of this internal network reside on the Line Boards; the core (spine) switches reside on the Fabric Boards.

The population of Fabric Boards determines the bisectional bandwidth of the chassis. One Fabric Board results in a 4:1 over-subscribed network internally, two Fabric Boards gives 2:1 over-subscription, and four Fabric Boards gives a non-blocking (full bandwidth) chassis. Due to the properties of Clos networks, the bisectional bandwidth depends solely on the Fabric Boards and is independent of the number of Line Boards installed.

Most Voltaire switch installations include all four Fabric Boards (full bandwidth).

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1.2 Major Features

- Non blocking full wire speed:
  - ISR 2012: Up to 288 InfiniBand 4X (20 Gbps DDR) ports in a 15U enclosure
  - ISR 2004: Up to 96 InfiniBand 4X (20 Gbps DDR) ports in a 6U enclosure
- Modular architecture that allows any combination of InfiniBand ports and/or router blades
- Modular architecture that allows any combination of InfiniBand 4X ports and/or router blades
- Bisectional switch bandwidth in a passive Midplane architecture
- Fat Tree (Clos) topology provides less than 1 microsecond of latency between any two ports
- Redundant, hot-swappable sMB boards, power supplies and fans meet stringent availability requirements
- sMB board hosts embedded subnet management software and GridVision™ network management suite
- InfiniBand™ specification 1.1 compliant, including support for InfiniBand form-factor I/O modules
- Using router blade drawers, multiple I/O modules can be pooled to create a large virtual router for bandwidth aggregation and high-availability—all are managed as a single entity

1.3 Product Architecture

The Voltaire ISR 2012/2004 Grid Director is a modular, rack-mountable chassis which can be configured for a wide range of applications.

Highlights of the ISR 2012/2004 architecture:

- ISR 2012 supports up to twelve (12) Line Boards with 24 4X InfiniBand copper interfaces for connectivity between the Line cards and the Switch fabric
- ISR 2004 supports up to four (4) Line Boards with 24 4X InfiniBand copper interfaces for connectivity between the Line cards and the Switch fabric
- Optical interfaces are supported with Media Converter devices as detailed in Section 3.18.2, "Supported Optical Cable List"

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- Optional Router Blade Drawers (sRBD-20) can contain up to two IPR router blades. Up to 11 sRBD-20 units can be installed in the ISR 2012, and up to 4 sRBD-20 units in the ISR 2004
- 10Gbit Ethernet board sRB-20210G (10GbE Board) provides 22 InfiniBand ports and two 10GbE ports
- Supports up to four vertical Fabric Boards (sFB-2012/sFB-2004)
- Supports one or two redundant hot swappable High-Memory Management Boards (sMB-HM) for fabric management (GridVision) and chassis management; when two sMB boards are installed, they support failover capabilities in the event of failure of one of the boards
- Supports multiple Power Supply Units (sPSUs) with N:1/N:N redundancy
- Front-to-rear air cooling system consisting of a horizontal Fan Unit (sFU-8) and a vertical Fan Unit (sFU-4 Fan Unit for the ISR 2012 and sFU-2004 for the ISR-2004)
- Cabling for InfiniBand, management, and power located at rear of chassis
- Remote management through the GUI (Graphic User Interface); SNMP MIB agent built into devices; both Entity Management and network-wide (fabric) management
- Local management and provisioning through CLI (Command Line Interface)
- sCTRL board provides system interfaces for management (Ethernet and serial)
- Rear side of the ISR 2012 chassis can host any combination of up to 12-hot-swappable sLB-2024 Line Boards (each with 24 4X IB ports), up to 12-sRB-20210G (10GbE) modules, and/or up to 11 sRBD-20s (Router Board Drawers) containing up to two IPR Router Modules. In addition, the rear of the chassis houses up to five power supply modules and an sCTRL card which provides the management interfaces to the chassis
- Rear side of the ISR 2004 chassis can host any combination of up to 4 hot-swappable sLB-2024 Line Boards (each with 24 4X IB ports), up to 4 sRB-20210G (10GbE) modules, and/or up to 4 sRBD-20s (Router Board Drawers) containing up to two IPR Router Modules. In addition, the rear of the chassis houses up to four power supply modules and an sCTRL card, which provides the management interfaces to the chassis

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1.3.1 Main Building Blocks

The ISR 2012 rear panel has 12 slots, the ISR 2004 has 4 slots in which you can mix and match the following modules: sLBs, sRBD-20s, and/or sRB-20210G (10GbE) modules.

NOTE

When installing an sRBD-20 in the ISR2012, at least one sLB module must be plugged-in for proper InfiniBand interconnectivity.

Figure 1-5 is a simplified functional block diagram of the ISR 2012 components.

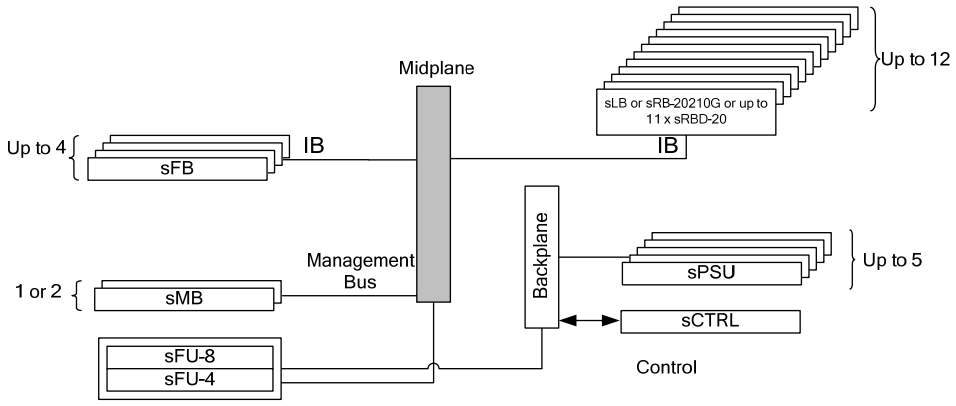

Figure 1-5. ISR 2012 Block Diagram

Figure 1-6 is a simplified functional block diagram of the ISR 2004 components.

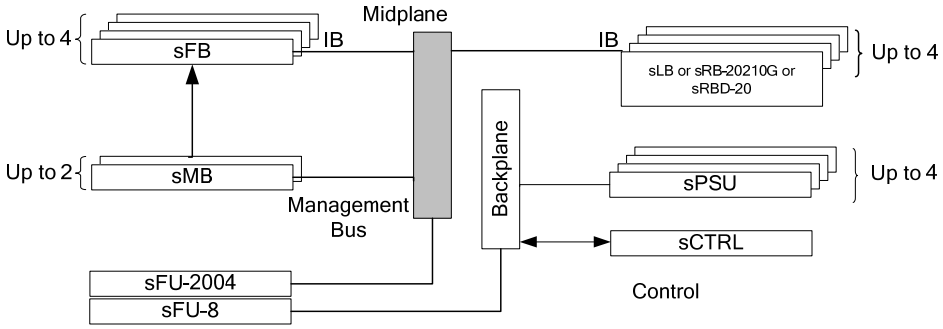

Figure 1-6. ISR 2004 Block Diagram

The main building blocks of the ISR 2012/2004 chassis are listed and described in the following sections:

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Grid Director Midplane

The Grid Director includes a passive board called a Midplane that connects the InfiniBand differential signals, control signals and power between the different boards in the chassis (sFB signals are routed from the front of the chassis to the Midplane; sLB and Router Module signals are routed from the rear of the chassis to the Midplane.) The Midplane is not field serviceable.

Grid Director Power Backplane

The sPSU and sFU-8 modules are connected to the system through the backplane, which provides the mechanical, control and electrical interface to the controllable AC/DC 48V power supplies. It allows electric current flow, supplies power to the Midplane via a special power harness, and provides connectivity to the Midplane, the Fan Unit (sFU-8) and the rear control panel (sCTRL).

Air Flow Cooling System

The ISR 2012/2004 uses front-to-back air flow cooling and provides fully redundant, monitored fans. Fan speed is dynamically controlled as a function of temperature.

The air cooling system includes a horizontal fan unit (sFU-8), containing eight fans. The ISR 2012/2004 also has a vertical fan unit (ISR 2012: sFU-4, ISR 2004: sFU-2004) containing four fans.

LED indications on the sFU-8 and sCTRL board provide an on-site report on the operating conditions of the air cooling system modules, and provide an alarm indicator in the event of a high temperature condition..

Firmware

Each sLB and sFB incorporates InfiniBand 24-port switch (ASIC) devices with locally attached memory containing firmware that controls basic functionality of the devices. The firmware controls low level link and physical layers functionality as well as higher level subnet management agent (SMA) and performance management agent (PMA) functionality. The firmware may be upgraded via Ethernet, RS-232 or I^2C on the sMB board or in-band via any of the InfiniBand sLB ports.

Management

The ISR 2012/2004 Management Board (sMB) features embedded GridVision™ management software, making the system easy to deploy and operate.

GridVision™ provides a command line interface (CLI), embedded web server for graphic user interface (GUI), and a SNMP interface for flexible access to the ISR 2012/2004's comprehensive management capabilities.

The Subnet Manager software automatically discovers the fabric topology and configures the hosts and switches for ease of operation.

The main building blocks of the software are detailed below.

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GridVision Fabric Management (FM)

- Overall resource view, grouping, hierarchies, discovery
- InfiniBand Subnet Manager (SM), Subnet Administration (SA), and Performance Manager (PM)
- Proactive monitoring and diagnostics
- Partitioning, Quality of Service (QoS), traffic optimization

GridVision Device Management (DM)

- Control a device (e.g., a switch) or a device cluster
- Remote management, upgrades, logs/alarms

Network Traffic Management

- Layer 2-7 network services, and inter-domain/fabric connectivity

Storage Resource Management

- Discovery and provisioning of storage resources

For additional information, please refer to the Switch User Manual, listed in the Related Documentation section at the beginning of this manual.

Grid Director Field Replaceable Units (FRUs)

The following are the Grid Director Field Replaceable Units (FRUs). All FRUs are hot swappable components.

Fabric Board (sFB)

The Grid Director supports up to four hot-swappable Fabric Boards (sFB), as detailed below, which determine the total bandwidth of the switching Clos topology within the chassis:

Table 1-1. Supported Fabric Boards

Grid Director	sFB Slots
ISR 2012	Hosts up to 4 sFB-2012s (20Gbps)
ISR 2004	Hosts up to 4 sFB-2004s (20Gbps)

The Grid Director supports up to twelve hot-swappable Line Boards (sLB) as detailed below:

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Table 1-2. Supported Line Boards

Grid Director	sLB Slots [s4]
ISR 2012	Hosts up to 12 sLB-2024s (20Gbps)
ISR 2004	Hosts up to 4 sLB-2024s (20Gbps)

High-Memory Management Board (sMB-HM)

The Grid Director one, or in same cases two, redundant hot-swappable High-Memory Management Boards, each including a CPU Mezzanine.

Router Blade Drawer for the ISR 2012/2004 (sRBD-20)

A mechanical and electrical interface that can host up to two IPR Router Modules

- ISR 2012 enclosure can contain up to 11 hot-swappable sRBD-20 cards
- ISR 2004 enclosure can contain up to 4 hot-swappable sRBD-20 cards

10GbE Board (sRB-20210G)

- ISR 2012 enclosure can contain up to 12 hot-swappable sRB-20210G cards
- ISR 2004 enclosure can contain up to 4 hot-swappable sRB-20210G cards

Power Supplies (sPSU)

Voltaire Grid Director switches support multiple power supply modules (sPSUs) configured in redundant, hot-swap, current sharing mode for N:1 or N:N redundancy, depending on the configuration, and suitable for 100-240 VAC mains voltage (auto-sense). The Grid Director supports power supply modules as follows:

- ISR 2012 supports up to 5 sPSUs
- ISR 2004 supports up to 4 sPSUs

Fan Units (sFU)

- ISR 2012 accommodates a vertical fan unit with 4 fans (sFU-4)
- ISR 2004 accommodates a vertical fan unit with 4 fans (sFU-2004)
- Grid Director accommodates a horizontal fan unit with 8 fans (sFU-8)

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1.3.2 Control Panel and Reset Buttons

In the rare event of an ISR 2012/2004 system lock-up, the Reset button can be used to reset the system.

The system has two Reset buttons: one is located on the front panel of the sFU-8 fan assembly horizontal module and one on the front panel of the sCTRL board.

Management Reset

To reset the ISR 2012/2004, push any of the reset buttons using a thick wire or tip of a pen.

Pressing the Reset button for one second resets the sMB board only; pressing the Reset button for at least six seconds resets the entire chassis.

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Chapter 2. System Configurations

This chapter provides a detail of the Voltaire ISR 2012/2004 Grid Director System configurations.

This chapter contains the following sections:

2.1 Configuration Summary 2-2
2.2 List of Modules 2-4
2.3 ISR 2012 Configuration 2-5
2.4 ISR 2004 Configuration 2-5
2.5 Common Configuration Features for the ISR 2012 and ISR 2004 2-6

2.1 Configuration Summary

2.1.1 Naming Conventions per Product

Table 2-1. Naming Conventions per Product

Board	ISR 2012	ISR 2004
Line Board	sLB-2024	
Fabric Board	sFB-2012	sFB-2004
Power Supply	sPSU	
Vertical Fan Unit	sFU-4	sFU-2004
Horizontal Fan Unit	sFU-8	
Management Board	sMB	
Control Board	sCTRL	
Router Blade	sRBD-20	
10GbE Board	sRB-20210G	
IP Router	IPR	
Fibre Channel Router	N/A	

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2.1.2 Specifications Summary

The following table summaries the ISR specifications according to model.

Table 2-2. Feature Summary Table

Feature	ISR 2012	ISR 2004
Rack Height	15U	6U
Rack Width	19"	19"
Switch Type	Director	Director
Backplane Bandwidth	11.52 Tbps	3.84 Tbps
sLB Slots	12	4
sRBD-20 Slots	11	4
sRB-20210G Slots	12	4
sFB Slots	4	4
Max # of InfiniBand Ports	288 20 Gbps InfiniBand Ports	96 20 Gbps InfiniBand Ports
Integrated I/O	Yes	Yes
Interface Type	4X 20 Gbps (DDR) CX4 ports with support for optical adapters and cables	4X 20 Gbps (DDR) CX4 ports with support for optical adapters and cables
Redundant Components	Power Supplies (sPSUs) Fan Units (sFUs) Management Boards (sMB)	Power Supplies (sPSUs) Fan Units (sFUs) Management Boards (sMB)
Embedded Fabric Management	Yes	Yes

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2.2 List of Modules

Table 2-3 provides a comprehensive list of modules as well as the maximum number of modules that can be installed in an ISR 2012/2004 system.

NOTE

Some of the components are provided with the basic configuration chassis; other components are separate modules and others are optional.

Table 2-3. Voltaire® ISR 2012/2004 – Grid Director

Description	ISR 2012 Module Name and Configuration	ISR 2004 Module Name and Configuration
Up to four Voltaire Fabric Boards	sFB-2012 (up to four)	sFB-2004 (up to four)
One or two sMBs (the second one is optional) with GridVision™ software packages	sMB (one or two)	
Horizontal Fan Units	Horizontal: 1 sFU-8 Horizontal Fan Unit Drawer (containing 8 fans) (default)	
Vertical Fan Units	Vertical: sFU-4	1 sFU-2004 Vertical Fan Unit (containing 4 fans) (default)
Control Unit	sCTRL	
Power Supply Unit	sPSU (up to five)	sPSU (up to four)
Cabling guide bracket kit (chassis gripping) - Optional	Chassis gripping bracket kit	
Cabling guide bracket kit (rack gripping) - Optional	Rack gripping bracket kit	
Voltaire 24 4X InfiniBand ports modular Line Board; support for Fiber Media Converter, optical cables and Active Cables	sLB-2024	
Router Blades Drawers	Up to 11 X sRBD-20 units Each sRBD-20 can host up to 2 IPR (IP Routers) (I/O)	Up to 4 X sRBD-20 units Each sRBD-20 can host up to 2 IPRs (IP Routers) (I/O)
sRB-20210G (10Gbit Ethernet I/O Board)	Up to 12 X sRB-20210G units (10Gbit Ethernet)	Up to 4 X sRB-20210G units (10Gbit Ethernet)

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2.3 ISR 2012 Configuration

Table 2-4. ISR 2012 Configuration

Description	Module Name	Voltaire P/N	Voltaire P/N Field Replaceable Unit
ISR 2012 basic configuration chassis	ISR 2012	501S39288	501S39288-F (empty chassis)
- Single Hi-Memory Management Board with GridVision™ embedded scalable package	sMB-HM		
- Horizontal Fan Units	sFU-8		
- Vertical Fan Unit	sFU-4		
- Rear panel Control	sCTRL		
- Two Power Supply Units	2 x sPSU		
sFB-2012, 12-DDR-connections Fabric Board	sFB-2012	501S12001	N/A
sMB-HM, Hi-memory Management Board	sMB-HM	501S40070	N/A

2.4 ISR 2004 Configuration

Table 2-5. ISR 2094 Configuration

Description	Module Name	Voltaire P/N	Voltaire P/N
ISR 2004 basic configuration chassis	ISR 2004	501S39096	501S39096 (empty chassis)
- Single Hi-Memory Management Board with GridVision™ embedded scalable package	sMB-HM		
- Vertical Fan Unit	sFU-2004		
- Horizontal Fan Unit	sFU-8		
- Rear panel Control	sCTRL		
- One Power Supply Units	1 x sPSU		
sFB-4, 4-connections Fabric Board	sFB-2004	501S40133	501S40133
sMB-HM, Hi-memory Management Board	sMB-HM	501S40070	501S40070-F

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2.5 Common Configuration Features for the ISR 2012 and ISR 2004

Table 2-6. Modules for Voltaire® Grid Director™ ISR 2012/2004

Description	Module Name	Voltaire P/N	Voltaire P/N Field Replaceable Unit
sLB-2024, 24 4X DDR InfiniBand ports Line Board	sLB-2024	501S24001	N/A
sPSU, Power supply unit	sPSU	501S40100	N/A
InfiniBand products are RoHS compliant. sLB-2024 supports fibre Media Converters			

Table 2-7. Accessories and Spare Parts for Voltaire® Grid Director™ ISR 2012/2004

Description	Module Name	Voltaire P/N	Voltaire P/N Field Replaceable Unit
sFU-8, Horizontal Fan Unit	sFU-8	N/A	501S40090-F
sFU-4, ISR 2012 Vertical Fan Unit	sFU-4	N/A	501S40060-F
sFU-2004, ISR 2004 Vertical Fan Unit	sFU-2004	N/A	MOD-00005-F
sCTRL, Rear panel Control	sCTRL	N/A	501S40020-F
sRK, Rail Kit	sRK	N/A	510S40014-F
sCGC-96, Cabling guide bracket kit (chassis gripping)	sCGC-96	510S40017	510S40017-F
sCGR-96, Cabling guide bracket kit (rack gripping)	sCGR-96	510S40016	510S40016-F
sCGC-288, Cabling guide bracket kit (chassis gripping)	sCGC-288	510S40013	510S40013-F
sCGR-288, Cabling guide bracket kit (rack gripping)	sCGR-288	510S40012	510S40012-F

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Chapter 3. ISR 2012/2004 Specifications

This chapter provides in detail the Voltaire ISR 2012/2004 Grid Director System Specifications.

This chapter contains the following sections:

3.1 ISR 2012/2004 Architecture 3-3
3.2 ISR 2012/2004 Fabric Board (sFB) Specifications 3-4
3.3 ISR 2012/2004 Line Board (sLB) Specifications 3-5
3.4 ISR 2012/2004 Management Board (sMB) Specifications 3-6
3.5 ISR 2012/2004 Router Blade Drawer (sRBD-20) and I/O Module (IPR) Specifications 3-6
3.6 sRB-20210G (10GbE) Specifications 3-7
3.7 Control Panel (sCTRL) Specifications 3-7
3.8 Chassis Slot Numbering 3-8
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3.1 ISR 2012/2004 Architecture

Table 3-1. ISR 2012/2004 Architecture

ISR 2012/2004 Common Features	ISR 2012 Specific	ISR 2004 Specific
Architecture		
• Four slots of Fabric boards in front of the chassis • Based on passive Midplane board which allow the IB differential signals, control signals and power connectivity between the different boards in the chassis • Cables for InfiniBand, management, and power all located at the rear	Up to 288 InfiniBand 4X (20 Gbps) ports	Up to 96 InfiniBand 4X (20 Gbps)
	12 slots for a combination of Line Boards/sRBD-20s/ 10GbE in the rear	4 slots for a combination of Line Boards/sRBD-20s/ 10GbE in the rear
Bisectional switch bandwidth (DDR)	11.52 Tb/s	3.84 Tb/s

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3.2 ISR 2012/2004 Fabric Board (sFB) Specifications

Table 3-2. ISR 2012/2004 Fabric Board (sFB) Specifications

ISR 2012/2004 Features	ISR 2012 Specific	ISR 2004 Specific
Fabric Board (sFB)		
• Up to four hot-swappable(*) sFBs running with Double Data Rate (DDR) which support the switching Clos topology	sFB-2012	sFB-2004
ISR 2012/2004 sFB Common Features		
• Hot-swappable operation with no traffic disruptions • EEPROMs to store the switch ASIC ERP (Embedded RISC processor) code • Indicators: Physical connectivity and logical connectivity LEDs per Line Board link port, power, info and hot-swap LEDs • On-board temperature monitoring reported to Management system • Thermal shutdown for over temperature sensing		

NOTE (*)

Make sure that each sMB has an sFB installed right next to it. (The sMB runs GridVision Fabric and Device Managers via the sFB-2012 card adjacent to it). The sFB adjacent to the master sMB may not be removed during operation.

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3.3 ISR 2012/2004 Line Board (sLB) Specifications

Table 3-3. ISR 2012/2004 Line Board (sLB) Specifications

ISR 2012/2004 Common Features		ISR 2012 Specifics	ISR 2004 Specifics
Hot-swappable Line Boards (sLB) running with 20 Gbps Double Data Rate (DDR) • 24 auto-sensing 4X InfiniBand ports (20 Gbps) • Connectors: 8-pair CX4 front 4X connectors • Each port supports hot-pluggable Media Converter for optical cable, optical cable or Active cables • Indicators: Physical connectivity and logical connectivity LEDs per port, power and info LEDs • On-board temperature monitoring reported to Management system • Thermal shutdown for over temperature sensing		Up to 12 sLB-2024	Up to 4 sLB-2024
Data throughput DDR		11.52 Tb/s	3.84 Tb/s
Port-to-port Latency	420 nanoseconds (max.)		
Data Virtual Lanes	8		
Management Virtual Lanes	1		
MTU	4096 Bytes, max		
Maximum hops	3		

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3.4 ISR 2012/2004 Management Board (sMB) Specifications

Table 3-4. ISR 2012/2004 Management Board (sMB) Specifications

ISR 2012/2004 Common Features	
High Memory Management Board (sMB)	
Two hot swappable sMB boards, each including a CPU Mezzanine: • On board Temperature monitoring reported to optional Management system • Thermal shutdown for over temperature sensing	
InfiniBand Managers	Subnet Manager, Subnet Administrator, and Performance Manager
InfiniBand Agents	Subnet Manager agent and Performance Manager agent
IETF Standards	SNMPv2
Connectors	10/100 Ethernet RJ45, EIA/TIA-232 Console RJ45

3.5 ISR 2012/2004 Router Blade Drawer (sRBD-20) and I/O Module (IPR) Specifications

Table 3-5. ISR 2012/2004 sRBD-20 and I/O Module (IPR) Specifications

Voltaire TCP/IP Router (IPR)
• Router Blade Drawer (sRBD-20) • Up to two InfiniBand form factor Router Blades may be installed in each sRBD-20 • InfiniBand form factor for integration with ISR 2012/2004 and OEM systems: – Four interfaces, IEEE 802.3ab, and 802ad (link aggregation) compliant – Connectors: four ports, 1000BASE-SX SFP RJ45 or optic (SMF - optional); RJ45 for Management – Indicators: two InfiniBand link/activity LEDs, four GbE link/activity LEDs, system LED and management link LEDs – Blade reset button

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3.6 sRB-20210G (10GbE) Specifications

Table 3-6. sRB-20210G (10GbE) Specifications

ISR 2012/2004 Common Features
• sRB-20210G (10GbE) Module • Voltaire Grid director ISR 2012/2004 DDR compliant • 19” x 1U • Power and cooling from chassis • 22 CX4 IB connectors • 2 cages to support MSAs • Support 24 4x DDR IB ports to ISR 2012/2004 mid plane via connectors • Includes the following certifications: EMC, TUV(US & EU), GOST, S-Mark, CCC, MIC, BSMI, C-Tic • Reliability criteria of MTBF - 150,000 h • Dual purpose module that provides both “traditional” IB switching capability (similar to other sLB-24D modules) and 10GbE ports that convert IB traffic to (and from) Ethernet traffic while applying IPoIB protocol and other Ethernet standards • ISR 2012, ISR 2004 DDR (not SDR compliant) mechanically and management wise Compliant line module of 19” x 1U • Comprises 2 x 10GbE LAN ports along with 22 IB 4x DDR interoperable ports • Software specification includes additions and changes to the sMB software, sRB-20210G modules description, and management definitions • Front panel – LED indications • User interface: – CLI: Telnet – GUI: VDM and VFM

3.7 Control Panel (sCTRL) Specifications

Table 3-7. ISR 2012/2004 Control Panel (sCTRL) Specifications

ISR 2012/2004 Common Features
Control Panel (sCTRL)
• Connectors: EIA/TIA-232 Console DB-9, 10/100 Ethernet RJ45 • Indicators: Subnet manager activity (2 LEDs), chassis management activity (2 LEDs), sFBs (4 LEDs) and temperature LED • Management/device reset button

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3.8 Chassis Slot Numbering

Slot numbering at the front of the chassis (for sMB and sFB) is from left to right (indication on the sFU-8).

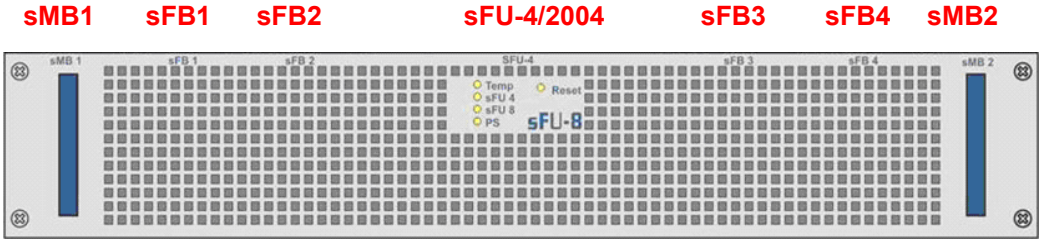

Figure 3-1. sFU-8 Fan Unit"

Slot numbering at the rear of the chassis (for sLB) is from top to bottom (indication on the cable guide brackets).

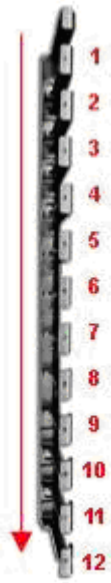

Figure 3-2. ISR 2012 sLB Slot Numbering

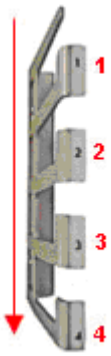

Figure 3-3. ISR 2004 sLB Slot Numbering

For specific instructions, please refer to the Chapter 6 on Installing System Boards.

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3.9 Torque Settings

Table 3-8. Torque Settings for Module Assembly

Assembly	Torque (in/lb)
ISR 2012 and ISR 2004	
sLB-2024 Line Board to chassis	2 (or use manual screwdriver)
sRB-20210G Board to chassis	2 (or use manual screwdriver)
sMB Management Card to chassis	2 (or use manual screwdriver)
Rail kit part A to part B	10
Rail to chassis	10
sFB-2012 Fabric Board to chassis	2 (or use manual screwdriver)
ISR 2012	
sFB-2012 Fabric Board to chassis	2 (or use manual screwdriver)
ISR 2004	
sFB-2004 Fabric Board to chassis	2 (or use manual screwdriver)

3.10 Module Configuration Rules

The ISR 2012/2004 supports up to two sMB modules. Two sMBs are used for redundancy/failover implementation. Use slot one (left) when only one sMB is installed. (Please refer to the sMB Installation Section 6.6.)

The ISR 2012/2004 supports any sFB configuration (between 1 and 4.) If fewer than four sFBs are connected, they must be placed according to the following order:

1. Slot 1 (must be adjacent to sMB 1)
2. Slot 4
3. Slot 2

If you install a full sFB configuration, they can be placed in any order. (Please refer to sFB installation in Section 6.3.)

When installing the sLBs, start at the bottom of the chassis and work your way up to avoid friction between components of adjacent sLBs/sRBD-20/sRB-20210G. (Please refer to sLB-2024 in Installation Section 6.4.)

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3.11 Racking Rules - Clearance Requirements

Table 3-9. Clearance Requirements

Area	Recommended Minimum Clearance
Front of the rack	36” (90 cm) for technician access and maintenance
Rear side of the rack	24” (60 cm) for human accessibility
Sides of the rack	No limits
Space below the chassis	There are two rack mount options. Option 1 is for exact U alignment whereby the rail kit occupies 3mm of the 1U rack space under the chassis. Therefore, a minimum of 1U clearance is required. However, your specific rack type may require additional clearance. Make sure that you carefully follow the rack installation guidelines described in Section 5.2 on Rack-Mounting the ISR 2012/2004 Chassis, page 5-9. (Option 2 is for alignment with the hole above the 1 U marking. This does not require clearance under the chassis)
Space on top of the chassis	No limits

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3.12 Power Data

3.12.1 Type of Power Cord on the Power Supply

With each sPSU, Voltaire provides a 15Amp cord (2 meter jumper), with a universal plug for a PDU (Power Distribution Unit.) This cord is detachable from the Voltaire ISR 2012/2004 chassis/sPSU. Cable wiring: 3x14AWG.

3.12.2 Power Requirements

Table 3-10. ISR 2012/2004 Power Requirements

ISR 2012/2004 Common Features	ISR 2012Specific	ISR 2004Specific
Power Requirements		
Power Supply Modules (sPSU) with N:1 or N:N redundancy. Note: each Power Supply has its own power cord.	Up to 5 Power Supplies	Up to 4 Power Supplies
Electrical Rating	100-240 VAC, 28A	100-240 VAC, 11A
Typical Power Consumption (DDR full configuration)	1950 Watt	775 Watt
Leakage current @264 V [mA]:	6.17mA RMS (Note that leakage exceeds 3.5mA only when more than 2 power supplies are used)	4.96mA RMS
Indicators	Operational AC and DC Status LEDs	
Operating voltage	100-240 VAC, 50-60 Hz auto-sensing	
Power factor	0.98 typical at 230Vac, full load 0.98 typical at 115Vac, full load	
Temperature rating	0-50 degrees Centigrade	

NOTE

Power Supply location is not important.

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3.12.3 sPSU Characteristics

Table 3-11. sPSU Characteristics

Attribute	Specification	Comments
Power Entry	85 – 265 volts, 50 – 60 Hz, auto-sensing	
Power Rating	800 Watts per module	
Nameplate Power Rating (VA)	Input: 100V-240Vac @ 12A; Output: 48Vdc @ 16.5A	Max input is 1024 VA
Nameplate Power Rating at 100V	9.6 A	
Nameplate Power Rating at 200V	4.5 A	
Power Factor (W/VA)	0.98 typical at 230 Vac, full load; 0.98 typical at 115 Vac, full load	Watts = Volts x Amps x Power Factor
Power Supply Efficiency	88% typical at 230Vac, full load rated power; 85% typical at 115Vac, full load rated power	A measure of the ability of the power supply to convert source AC power into usable DC power

3.12.4 Power Data per Module

Computing the Required Number of sPSU Power Supply Modules

To find the minimum number of power supply modules required for a given switch configuration, follow these steps:

- According to the built configuration, add-up all DC power consumption numbers
- The sPSU is designed to provide 800 Watt max. However, Voltaire suggests running the sPSU with up to 750 Watt (round-up to get the number of active sPSU modules required in the system)
- Increase the number of sPSU modules according to redundancy requirements

The sPSU is designed to provide 800 Watts maximum. Voltaire recommends configuring the chassis so each sPSU is no more than 750 Watts.

This formula provides margin for momentary power peaks and enhances reliability by preventing the power subsystem from continuously operating at maximum power.

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For redundancy (N:1 or N:N), configure additional power supplies.

Example 1:

Fully populated ISR 2012 DDR, high availability configuration (basic configuration chassis, 4*sFB-2012, 12*sLB-2024, additional sMB)

Basic configuration (BC): sMB + sFU8 + sFU4 + sCTRL = 220W

Total DC power consumption: 220 (BC) + 4*115 (sFB2012) + 12*80 (sLB2024) + 35 (sMB) = 1,675W

Required active sPSU modules: Roundup (1,675/750) = 3. For N+1 redundancy - use 4 sPSU modules (2 are provided with the basic chassis)

Example 2:

Fully populated ISR 2004 DDR + one sRB-20210G, high availability configuration (basic configuration chassis, 4*sFB-2004, 3*sLB-2024, 1*sRB-20210G additional sMB)

Basic configuration (BC): sMB + sFU8 + sFU2004 + sCTRL = 220W

Total DC power consumption: 220 (BC) + 4*40 (sFB2004) + 3*80 (sLB2024) + 135*1 (sRB-20210G) + 35 (sMB) = 790W

Required active sPSU modules: Roundup (790/750) = 1. For N+1 redundancy - use 2 sPSU modules (1 are provided with the basic chassis)

Table 3-12. Module Power Data

Voltaire® Grid Director™ ISR 2012

Description	Module Name	DC Power Consumption [Watt]
Basic chassis configuration • Single Hi-Mem Management Board with GridVision™ embedded package • Horizontal Fan Units • Vertical Fan Unit • Rear panel Control • Two Power Supply Units	ISR 2012 sMB-HM sFU-8 sFU-4 sCTRL 2 x sPSU	220.0
sFB-2012, 12-DDR-connections Fabric Board	sFB-2012	110.0
sMB-HM, Hi-memory Management Board	sMB-HM	35.0

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Voltaire® Grid Director™ ISR 2004

Description	Module Name	DC Power Consumption [Watt]
ISR 2004 basic configuration chassis	ISR 2004	220.0
Single Hi-Mem Management Board with GridVision™ embedded package	sMB-HM	
Horizontal Fan Unit	sFU-8	
Rear Panel Control	sCTRL	
Single Power Supply Unit	sPSU	
Vertical Fan unit	sFU-2004	
sFB-2004, 4-DDR-connections Fabric Board	sFB-2004	40.0
sMB-HM, Hi-memory Management Board	sMB-HM	35.0

Modules for the Voltaire® Grid Director ISR 2012/2004

Description	Module Name	DC Power Consumption [Watt]
sRB-20210G 22 4X IB ports and 2 10GbE ports line board for ISR 2012 & ISR 2004	sRB-20210G	100.0*
sRBD-20 Router Blade Drawer for ISR 2012 & ISR 2004	sRBD-20	5.0
IPR - IP Router - InfiniBand form factor, 4 RJ-45 SFPs included)	IPR	35.0
sLB-2024, 24 4X DDR InfiniBand ports Line Board	sLB-2024	90.0*

* Add 1Watt for each connected Media Converter module

Spare Parts for the Voltaire® Grid Director™ ISR 2012/2004

Description	Module Name	DC Power Consumption [Watt]
sFU-8, Horizontal Fan Unit	sFU-8	120.0

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Spare Parts for the Voltaire® Grid Director™ ISR 2012/2004

Description	Module Name	DC Power Consumption [Watt]
sFU-4, Vertical Fan Unit	sFU-4	60.0
sFU-2004, Vertical Fan Unit	sFU-2004	60.0
sCTRL, Rear panel Control	sCTRL	5.0

3.13 Computing Heat Output in BTUs

To compute the approximate BTUs for a given configuration, find the power consumption in Watts (e.g., from Power Data Per Module Table 3-12), and multiply by 3.408. Example calculations for specific configurations are shown in Table 3-13.

Table 3-13. BTUs for DDR Sample Configurations

Configuration	Modules Included	Power (Watts)	Heat Output (BTUs)
ISR 2012			
24 ports 4x copper	4 sFB-2012, 1 sLB-2024, 1 sFU-8, 1 sFU-4, 1 sCTRL, 1 SMB, 2 sPSU	800	2,726
144 ports 4x copper	4 sFB-2012, 6 sLB-2024, 1 sFU-8, 1 sFU-4, 1 sCTRL, 1 SMB, 2 sPSU	1237	4216
288 ports 4x copper	4 sFB-2012, 12 sLB-2024, 1 sFU-8, 1 sFU-4, 1 sCTRL, 2 SMB, 3 sPSU	1815	6185
284 ports 4x copper + 4 10G ports	4 sFB-2012, 10 sLB-2024, sRBD-20, 2 IPR, sFU-8, 1 sFU-4, 1 sCTRL, 2 SMB, 3 sPSU	1723	5871
264 ports 4x copper+ 24 10G ports	4 sFB-2012, 12 sRB-2010G, 1 sFU-8, 1 sFU-4, 1 sCTRL, 2 SMB, 3 sPSU	1810	6168
ISR 2004			
24 ports 4x copper	4 sFB-4D, 1 sLB-2024, 1 sFU-8, 1 sFU2004, 1 sCTRL, 1 SMB, 1 sPSU	412	1404
48 ports 4x copper	4 sFB-4D, 2 sLB-2024, 1 sFU-8, 1 sFU2004, 1 sCTRL, 1 SMB, 1 sPSU	500	1704

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Configuration	Modules Included	Power (Watts)	Heat Output (BTUs)
96 ports 4x copper	4 sFB-4D, 4 sLB-2024, 1 sFU-8, 1 sFU2004, 1 sCTRL, 1 SMB, 1 sPSU	700	2386
88 ports 4x copper + 8 10G ports	4 sFB-4D, 4 sRB-2010G, 1 sFU-8, 1 sFU2004, 1 sCTRL, 1 SMB, 1 sPSU	826	2814

3.14 Cooling

Table 3-14. ISR 2012/2004 Cooling

ISR 2012/2004 Common Features		ISR 2012 Specific	ISR 2004 Specific
Horizontal Fan Unit (sFU-8)		Vertical Fan Unit (sFU-4)	Vertical Fan Unit (sFU-2004)
Heat dissipation	(max. for full configuration)	8000 BTU/Hour	3200 BTU/Hour

3.15 Airflow

Table 3-15. ISR 2012/2004 Airflow

Airflow	ISR 2012 Specific	ISR 2004 Specific
Rated volumetric air flow for a fully configured chassis.	Front-to-rear cooling 8000 BTU/Hour max The Rated volumetric air flow for a fully chassis is 440 CFM (Cubic Feet per Minute)	Front-to-rear cooling 3200 BTU/Hour max The Rated volumetric airflow for a fully chassis is 190 CFM (Cubic Feet per Minute)

3.16 Physical Characteristics

Table 3-16. ISR 2012/2004 Physical Characteristics

ISR 2012/2004 Common Features		ISR 2012 Specific	ISR 2004 Specific
19” rack mountable chassis		15U height	6U height
Dimensions	Width	19” (440 mm)	19” (440 mm)
	Depth	22.75” (578 mm)	22.75” (578 mm)

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	Height	25.6” (650 mm)	10.464” (265.8mm + 0.2)
Weight		128 to 163 lbs (58 to 74 kg), depending on configuration	46 to 83 lbs (21 to 38 Kg) depending on configuration
Optional front or rear rack mounting			
Minimum rack depth required for the rail kit		N/A	24” (60 cm)
Maximum rack depth required for the rail kit		N/A	40” (100 cm)

3.17 Weights and Dimensions

Table 3-17. Unpacked Weights & Dimensions

Module	English				Metric			
	Weight[2] (lbs)	D[1] (in)	W[1] (in)	H[1] (in)	Weight[2] (kg)	D[1] (cm)	W[1] (cm)	H[1] (cm)
ISR 2012/2004 Common Features								
sLB-2024	4.93	12.25	1.7	1.65	2.24	31.12	42.7	4.18
sRB-20210G	4.85	12.3	1.7	1.65	2.2	31.2	42.7	4.18
sMB	1.32	8.8	6.77	1.8	0.60	22.3	17.2	4.55
sRBD-20	5.23	13.58	16.93	1.65	2.37	34.5	43.0	4.18
IPR	1.65	10.24	4.60	0.12	0.75	26.0	11.7	3.0
sPSU	4.19	14.76	5.84	1.76	1.90	37.5	14.84	4.47
sFU-8	5.50	9.02	16.69	3.05	2.50	22.9	42.4	7.77
sCTRL	0.77	13.89	5.84	1.76	0.35	33.5	14.84	4.47
ISR 2012								
Basic configuration: chassis, sFU-8, sFU-4, sCTRL, 1 x sMB, 2 x sPSU	127.6	22.75	17.32	25.6	58	57.88	44 .00	65
sFU-4	7.94	9.65	20.76	5.09	3.60	24.5	52.74	12.94
sFB-2012	4.95	8.78	24.27	1.87	2.25	22.3	51.65	4.76
ISR 2004								

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Module	English				Metric			
	Weight[2] (lbs)	D[1] (in)	W[1] (in)	H[1] (in)	Weight[2] (kg)	D[1] (cm)	W[1] (cm)	H[1] (cm)
Basic configuration: chassis, sFU-8, sCTRL, 1 x sMB, 1 x sPSU	63.00	22.71	10.55	11.02	28.60	57.88	44	26.58
sFB-2004	49.17	8.78	6.77	1.87	0.70	22.3	17.2	4.76
sFU-2004								

(1) 1 in = 2.54 cm (2) 1 kg = 2.205 lbs

Table 3-18. Packed Weights & Dimensions

Module	English				Metric			
	Weight (lbs)	D (in)	W (in)	H (in)	Weight (kg)	D (cm)	W (cm)	H (cm)
ISR 2012/2004 Common Features								
sLB-2024	6.17	16.33	20.47	3.74	2.8	41.5	52.0	9.5
sRB-20210G	6.17	16.33	20.47	3.74	2.8	41.5	52.0	9.5
sRBD-20	7.27	16.14	20.47	3.35	3.3	41.0	52.0	9.0
IPR	2.05	6.90	13.00	0.24	0.93	17.5	33.0	6.0
sMB	1.85	9.84	13.19	2.75	0.84	25.0	33.5	7.0
sPSU	5.77	8.07	16.53	4.72	2.62	20.5	42.0	12.00
sFU-8	8.31	11.81	21.26	5.90	3.77	30.00	54.00	15.00
sCTRL	1.21	7.95	16.02	2.60	0.55	20.2	40.7	6.6
sLB Blank Panel	0.61	1.85	17.16	1.06	0.28	4.70	43.6	2.7
sPSU Blank Panel	0.24	1.97	6.26	1.65	0.11	5.00	15.90	4.2
sRK (Rail Kit)	15.43	5.23	24.21	2.56	7.00	13.3	61.5	6.5

Module	English	Metric

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	Weight (lbs)	D (in)	W (in)	H (in)	Weight (kg)	D (cm)	W (cm)	H (cm)
ISR 2012 Specific Features								
ISR 2012 base configuration: chassis, sFU-8, sFU-4, sCTRL, 1 sMB, 2 sPSUs	163.2	30.71	24.60	35.43	74	78.00	62.50	90.00
sFU-4	11.02	12.20	24.60	7.48	5.00	31.00	62.50	19.00
sFB-2012	6.68	12.40	24.21	3.93	2.97	31.50	61.50	10.00
sCGR-288 (Cable Management Bracket Kit)	6.17	5.71	20.94	1.69	2.80	14.5	53.2	4.3
sCGC-288 (Cable Management Bracket Kit)	7.05	8.46	21.26	1.77	3.20	21.5	54.0	4.5
sFB-2012 blank panel	0.88	2.12	21.18	1.02	0.40	5.40	53.80	2.60

Module	English				Metric			
	Weight (lbs)	D (in)	W (in)	H (in)	Weight (kg)	D (cm)	W (cm)	H (cm)
ISR 2004 Specific Features								
ISR 2004 base configuration: chassis, sFU-8, sCTRL, 1 sMB, 1 sPSU	92.99	30.71	24.80	19.49	42.18	78.00	63.0	49.5
sFB-2004	2.07	13.38	9.84	2.75	0.94	34.00	25.00	7.00
sFU-2004								
sCGR-96 (Cable Management Bracket Kit)	2.20	5.31	7.16	1.49	1.00	13.5	18.2	3.8
sCGC-96 (Cable Management Bracket Kit)	1.98	8.66	7.08	1.30	0.90	22.0	18.0	3.3
sFB-2004 blank panel	0.33	2.12	7.00	1.02	0.15	5.4	17.8	2.6

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3.18 Cables Supported by Voltaire

Voltaire certifies and approves specific cables.

Any other cable is not supported by Voltaire.

Refer to Chapter 7 for additional information on how to install and replace cables.

NOTE

The CLI Active-cable menu is provided for updating the **csv** file listing the parameters of the Voltaire supported cables. This file may therefore be updated also at the customer site. Notwithstanding this, prior to adding any new cable to the **csv** file, Voltaire must first certify and approve the addition.

3.18.1 InfiniBand Copper Cables

Table 3-19 lists the maximum cable lengths for the ISR 2012/2004 chassis. The values in the cells are the cable AWG values.

Table 3-19. ISR 2012/2004 – Maximum InfiniBand Cable Lengths

Max. Cable Length	ISR 20xx to ISR 20xx	ISR 20xx to ISR 9024D "Main" (Ports 1-12)	ISR 20xx to ISR 9024D "Mezz" (Ports 13-24)	ISR 20xx to HCA
0.5m	30	30	30	30
1m	30	30	30	30
2m	30	30	30	30
3m	30	30	30	30
4m	30	30	30	30
5m	30	30	30	30
6m	28	28	26	30
7m	26	26	26	30
8m	26	26	24	28
9m	24	24		28
10m	24	24		26
11m				26

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Max. Cable Length	ISR 20xx to ISR 20xx	ISR 20xx to ISR 9024D "Main" (Ports 1-12)	ISR 20xx to ISR 9024D "Mezz" (Ports 13-24)	ISR 20xx to HCA
12m				24
13m				24
14m				24

3.18.2 Supported Optical Cable List

Specification for InfiniBand 4x Standard Optical Cables for Voltaire Media Converters

Voltaire supports the following standard optical cable specification for use with the InfiniBand fiber 4-channel (4X) media converters:

The cable must be 50/125 Âµm multimode fiber with a minimum bandwidth of 500MHz/km. The most common ones used are in a "flat" parallel fiber configuration with 12 individual fibers (actually only the 4 outer-most fibers on each side of the cable are used) with either a plenum (typically yellow) or non-plenum (typically orange) covering/rating depending on what your particular needs are.

The fiber cable must be MPO to MPO terminated with the right polarity of AB to BA (e.g., fiber #1 to fiber #12)

Table 3-20 lists the maximum DDR optical cable lengths for the ISR 2012/2004 chassis (per MHz/KM).

Table 3-20. ISR 2012/2004 – Maximum Optical Cable Lengths

Cable Type	Microns	Bandwidth (MHz.km)	Length
CBL-00001 CABLE F/O MTP CONN.	50/125	500	2M
CBL-00002 CABLE F/O MTP CONN.	50/125	500	5M
CBL-00003 CABLE F/O MTP CONN.	50/125	500	10M
CBL-00004 CABLE F/O MTP CONN.	50/125	500	20M
CBL-00005 CABLE F/O MTP CONN.	50/125	500	30M
CBL-00006 CABLE F/O MTP CONN.	50/125	500	50M
CBL-00007 CABLE F/O MTP CONN.	50/125	2000	100M

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3.18.3 Gigabit Ethernet & 10 Gigabit Ethernet Cables

Gigabit Ethernet (Copper) 1000 Port / Ethernet Management 10/100 Port

Use modular, RJ-45, cross-connect UTP cables to connect the Fast Ethernet ports to end systems. Use modular, RJ-45 straight-through cables to connect to external switches and routers. The following shows straight-through cables cross-connect cables.

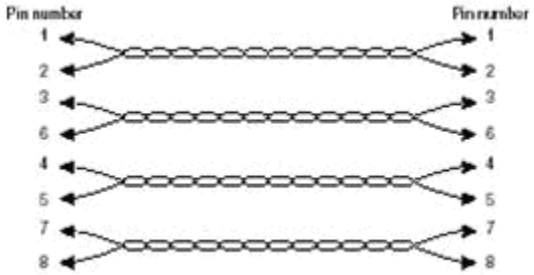

Figure 3-4. Straight-through Cables

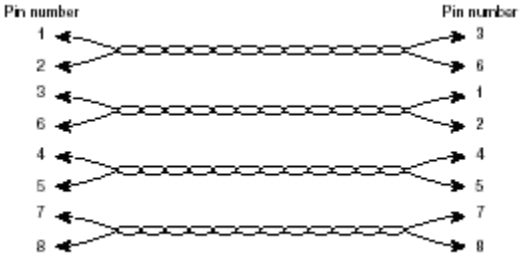

Figure 3-5. Cross-connect Cables (for Ethernet Management only)

The table below describes cabling specifications for the Gigabit Ethernet port.

Table 3-21. ISR 2012/2004 – Maximum InfiniBand Cable Lengths

Cable Rate	Connector Type	Fiber Type	Core Size (microns)	Maximum Cable Length
1GbE	LC	Multi-mode	62.5	902 ft (275 m)
10GbE	CX4	Copper	-	-
10GbE	LC	MMF & SMF	62.5 & 50	26, 33, 66, 82, 300m
10GbE	LC	SMF	G.652	10km

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3.19 Environmental Specifications

Table 3-22. ISR 2012/2004 Environmental Specifications

Ambient Operating Temperature	32° to 113°F (0° to 45°C)
Operating Humidity	15 to 80%, non-condensing
Operating Altitude	0 to 9843 ft (3000m)
Storage Temperature	-13° to 158°F (-25° to +70°C)
Storage Humidity	5 to 90% non-condensing
Storage Altitude	0 to 15,000 ft (4570m)

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3.20 Acoustic Data

Acoustic noise is reported in accordance with ISO 7779 [ECMA 74] standard.

Two acoustic test reports are available, as follows:

1. A-weight sound power level LwA:
   a. ISR 2012 LwA: 68.5 dBA sound power level (6.8 Bels)
   b. ISR 2004 LwA: 67 dBA sound power level (6.7 Bels)
2. A-weight sound pressure level LpA:
   a. ISR 2012 LpA Noise Level [db (A)]: Front – 60.2 / Back-55.1 / Right- 59.5 / Left-54.5
   b. ISR 2004 LpA Noise Level [db (A)]: Front – 57.9 / Back-57.2 / Right- 53.3 / Left-54.3

LpA test results are shown in the table below.

Table 3-23. Acoustic Noise Test Results for ISR 2012

Noise Pressure Level, dBA			
EUT Panel			
Front	**Left**	**Right**	**Rear**
56.4	56.1	52.2	49.9

Table 3-24. Acoustic Noise Test Results for ISR 2004

Noise Pressure Level, dBA			
EUT Panel			
Front	**Left**	**Right**	**Rear**
64	55	56	61

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3.21 Reliability (MTBF)

The Mean Time Between Failures (MTBF) for individual switch components is shown in Table 3-27. These figures indicate the mean elapsed time until a single component fails in the module, whether or not that failure impacts the operation of the switch. Note that in many cases redundant modules can be configured, which dramatically increases the overall system Mean Time Between Critical Failures (MTBCF).

Table 3-25. MTBF per Module Data

Chassis/Module	Description	MTBF (Hours)
Voltaire® Grid Director™ ISR 2012	ISR 2012 chassis with sCTRL, sFU-8, sFU-4	160,000
Voltaire® Grid Director™ ISR 2004	ISR 2004 chassis with sCTRL and SFU-8	260,000
sFB-2012	12 DDR connections Fabric Board	260,000
sFB-2004	4 DDR connections Fabric Board for ISR 2004	260,000
sLB-2024 for ISR 2012/2004	sLB-2024, 24 4X DDR InfiniBand ports Line Board for 2012	260,000
sRB-20210G for ISR 2012/2004	ISR2012: Up to 12 X sRB-20210G units (10Gbit Ethernet) ISR 2004: Up to 4 X sRB-20210G units (10Gbit Ethernet)	136,086
sPSU	Power supply	200,000
sMB (sMB-HM) Management Board	Hi-memory Management Board	350,000
sFU-2004 Horizontal Fan Unit FRU	Horizontal fan unit	410,000
sFU-4 Horizontal Fan Unit FRU	Horizontal fan unit	410,000
sFU-8 Vertical Fan Unit FRU	Vertical fan unit	330,000
sCTRL Control Panel FRU	Rear control panel	1,970,000

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3.22 Certifications

Table 3-26. Certifications

Safety:
• cULus (USA/CAN); UL60950-1:2003 First Ed. • CSA C22.2 No.60950-1-03 First Ed • cTUVus UL60950-1:2003 First Ed. • S-Mark Argentina • CB Certificate and report, according to IEC 60950-1 First Ed. • MIC Korea • Gost-R • CE according to EN 60950-1:2001 First Ed • S-Mark
EMC Certifications:
• FCC Part 15, Subpart B, Class A and testing to ANSI 63.4 • Industry Canada ICES-003 (CAN/CSA-CEI/IEC CISPR 22:02) • CE EN55022: 1998 + A1:2000 + A2:2003 EN55024: 1998 + A1:2001 + A2:2003 EN 61000-3-2:00+A2(05) Harmonic current emissions EN 61000-4-2: 1995 + A1: 98 + A2: 2001 EN 61000-4-3: 02 + A1: 2002 EN 61000-4-4: 1995 + A1: 01 +A2:2001 EN 61000-4-5: 1995 + A1: 2001 EN 61000-4-6: 1996 + A1: 2001 EN 61000-4-8: 1993 + A1:2000 EN 61000-4-11: 1994 + A1: 2001 EN 61000-3-3:95+A1 (01) Voltage fluctuations and flicker • Japan VCCI Technical Requirements, V.3/2001.04/CISPR 22:1997 + A1: 2000 + A2: 2002, Class A. • Australian/New Zealand C-Tick, AS/NZS CISPR 22:04 • MIC Korea
Restricted Hazardous Substances Certification:
RoHS-5
InfiniBand Certification:
IBTA 1.2

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3.23 Declarations

3.23.1 Declaration of Conformity

Voltaire products comply with the Radio & Telecommunications Terminal Equipment Directive 99/5/EEC, the EMC Directive 2004/108/EC, and of the Low Voltage Directive 2006/95/EC.

3.23.2 Hazardous Substances (RoHS 5) Compliance Declaration

Voltaire products comply with the RoHS directive under the exemption (RoHS 5) of lead in solders for servers, storage and telecommunication infrastructure.

3.23.3 WEEE Documentation

The Voltaire adds the WEEE "wheeled bin" symbol to the ISR 2012/2004 Grid Directors. In addition, Voltaire sets up a commercial agreement with each country in Europe with whom it is doing business. This commercial agreement includes a contract with a local contractor who is able to accept Voltaire's products for recycling/scrapping purposes.

3.24 Label(s)

The ISR 2012 and ISR 2004 labels (example) below show all safety and EMC text and logos.

ISR-2012
VOLTAIRE
501S39288 RRR
P/N :
MMWWYYxxxxxx
S/N :
* See Installation Instructions before connecting to the Power Supply
* Voir la notice d'installation avant de reccorder au r'eseau
* Vordem ansch liessen ans Netz die Installations anweisungen beachten
100-240V 50/60Hz 28A
POCC IL.MJI03.B00400
인증번호 : VOL-ISR2012 (A)
This device complies with part 15 of FCC rules.
Operation is subject to the following two conditions:
(1) This device may not cause harmful interference
(2) This device must accept any interference received,
Canada ICES/NMB-003 Class/Classe A
N420
LISTED
I.T.E.
E17018
この装置は、クラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。
VCCI－A

Figure 3-6. ISR 2012 Label (Example)

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ISR-2004
VOLTAIRE
P/N : 501S39096 RRR
S/N : MMWWYYxxxxxx
* See Installation Instructions before connecting to the Power Supply
* Voir la notice d'installation avant de reccorder au r'eseau
* Vordem ansch liessen ans Netz die Installations anweisungen beachten
100-240V 50/60Hz 15A
POCC IL.MJ03.B00518
인증번호 : VOL-ISR2004 (A)
This device complies with part 15 of FCC rules.
Operation is subject to the following two conditions:
(1) This device may not cause harmful interference
(2) This device must accept any interference received, including interference that may cause undesired operation
Canada ICES/NMB-003 Class/Classe A
N420
UL 60950-1
CSA C22.2 No. 60950-1
E112713
この装置は、クラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。
VCCI－A

Figure 3-7. ISR 2004 Label (Example)

3.25 Gost-R Certification

The Voltaire products comply with the Gost-R Russian safety regulations.

3.26 MIC-Korea Certification

The Voltaire products comply with the Korean MIC regulations.

3.27 List of Oscillator Speeds

Oscillator Speeds are as follows:

Table 3-27. Oscillator Speeds

Part Number	Description
141C33200	CRYSTAL 32.768KHZ 5.0 X 1.9 X 0.9 MM
141C53601	OSCILLATOR 3.6864MHZ 7 X 5 X 1.4 MM
141C62501	OSCILLATOR 25MHZ 7 X 5 X 1.4 MM 3.3V +50PPM
141C65000	OSCILLATOR 50MHZ 7.5 X 5.0 X 1.4 MM 3.3V +50PPM
141C66601	OSCILLATOR 66MHZ 3.3V 7X5X1.6MM + 50PPM
141C71100	OSCILLATOR 106.25MHZ 7 X 5 X 1.4 MM 3.3V +100PPM
141C71200	OSCILLATOR 125MHZ 5.0 X 7.0 X 2.0 MM

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141C71202	PECL OSCILLATOR 125MHZ 7 X 5 X 1.9MM +50PPM
141C71300	OSCILLATOR 133MHZ 3.3V 7X 5 X1.6MM SMT

3.28 Shock and Vibration Test Reports

Prepare the ISR 2012/2004 to ship in a rack by carefully following the rail kit installation instructions, as detailed in Section 5.2. The ISR 2012/2004 is susceptible to shock and vibration if the rail kit installation instructions are not precisely followed.

The following tables detail the shock & vibration test reports, compliant with shipping in a rack.

3.28.1 ISR 2004 Test for Transportation in a Rack

Table 3-28. Vibration

Vibration axes	3 axes (X,Y,Z)	
Random Vibration	Frequency range:	5-300Hz
	Vibration level:	1.03g RMS (Z axis) 0.7g RMS (X & Y axes)
	Vibration test for each axis	1 hour

Table 3-29. Bounce Loose Cargo

Bounce Direction	Loose cargo bounce was conducted on the base in 2 opposite directions
Bounce Machine Velocity	180 RPM
Bounce time	33 minutes in each direction
Total bounce time	66 minutes (11,800 rounds)

Table 3-30. Mechanical Shock

Number of shocks	3 shocks were conducted only on the vertical (Z) axis
Shock level	5 G
Time duration	10 msec.
Shape	Half sine

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Total number of shocks	3 shocks

Table 3-31. Free Fall

Type of drop	Tilt
Drop Height	20.3 cm.
Number of drops of test item	One drop was performed on each of two opposite edges of the test item
Total number of drops	2 drops

Table 3-32. Sine Vibration (Operation) Test

Vibration axes	3 axes (X,Y,Z)
Sweeping Frequency	5-500Hz
Vibration level	0.1g max
Vibration test for each axis	6 minutes & 38 seconds

3.28.2 ISR 2012 Test for Transportation without a Rack

Table 3-33. Vibration

Test	Description	ISR 2012	ISR 2004
Vibration Axes	3 axes (X,Y,Z)		
Random Vibration	Frequency range:	5-500Hz	5-300Hz
	Vibration level:	0.5g RMS (5-100Hz) 1.5g RMS (100-500Hz)	1.03g RMS (Z axis) 0.7g RMS (X & Y axes)
	Vibration test for	52 minutes	1 hour

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	each axis		

Table 3-34. Free Fall

Drop Height	0.3 meter
Number of drops of test item	One drop performed on the bottom face, 2 edges and 2 corners of the test item
Total number of drops	5 drops

3.29 Export Information

Export information is detailed below.

Table 3-35. Export Information

CTP value for the 440GX @ 800MHz with PPC440GP CPU @ 400MHz (sMB card)	~755 MTOPS (According to AMCC)

CCATS #	Product	ECCN #
G039683	RM-4Ge/GER400 InfiniBand Router Blade (IPR)	5A991C
G039677	HCA400 InfiniBand 4X Host Channel Adapter	5A991C
G039681	2012 InfiniBand Switch Router	5A991C
G039681	2004 InfiniBand Switch Router	5A991C
G039680	InfiniBand Fabric Management	5D991
	IB Cables for 4X ports	EAR99

3.30 Shipping Restrictions

None.

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3.31 Center of Gravity Data

The origin (X=0, Y=0, Z=0) is the lower left corner of the front of the chassis.

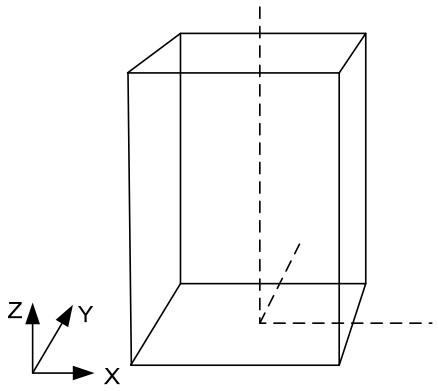

Figure 3-8. Center of Gravity Data

Center of gravity for minimum, typical, and maximum configurations are as follows:

Table 3-36. ISR 2012 Center of Gravity Data

ISR 2012	Width (X) - mm	Depth (Y) - mm	Height (Z) - mm
Empty Chassis	220	230	320
Basic Configuration	220	250	305
Full Configuration	220	285	300

Table 3-37. ISR 2004 Center of Gravity Data

ISR 2004	Width (X) - mm	Depth (Y) - mm	High (Z) - mm
Empty Chassis	220	273	129
Basic Configuration	215	270	130
Full Configuration	222	285	132

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3.32 Statement of Volatility

Some of the ISR 2012/2004 nonvolatile memory components such as Serial EEPROM, CPLD, FLASH, and GDX are burned at the factory.

In addition, the ISR 2012/2004 system contains DDR-SDRAM, SSRAM, and FPGA used as CPU attached volatile memory, cache memory elements, and programmable logic. Data contained in those components clears 15 minutes after the system is powered OFF.

None of the modules contain user or site-specific data except for the sMB; refer to the Voltaire Statement of Volatility document (P/N 399Z00080) for details.

For more details on volatility see Voltaire Statement of Volatility. This is listed in the related documentation at the beginning of the document.

3.32.1 sMB Volatility Statement

The sMB contains a Flash device (part of the PrPMC440).

3.32.2 Flash on PrPMC440

Description

Part contains operating system and software utility files.

Clearing Procedure

The part is either programmable or erasable under Linux OS and contains user data - Module IP address.

The IP address should be configured through system CLI interface command.

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Chapter 4. Packing and Unpacking

In This Chapter

This chapter provides step-by-step instructions for packing and unpacking the ISR 2012/2004 chassis. This material in this chapter applies to both the ISR-2012 and ISR-2004 except where indicated.

This chapter contains the following sections:

4.1 Package Contents 4-2
4.2 Packing the ISR 2012/2004.....4-7

4.1 Package Contents

The Grid Director ISR 2012 is supplied in a heavy duty tri-wall cardboard box secured with packing straps; the ISR 2004, together with all its accessories, is supplied in a cardboard box.

Refer to System Configurations on page 2-1 that lists the various ISR 2012/2004 configurations and items shipped with the chassis.

The "basic configurations" of the ISR 2012 and ISR 2004 are as follows:

- ISR 2012 - sFU-8: sFU-4, sCTRL, sMB
- ISR 2004 - sFU-8: sFU-2004, sCTRL, sMB

The ISR 2012/2004 chassis is shipped with a horizontal fan unit (sFU-8) installed in the front and an sCTRL board in the rear.

In addition, the ISR 2012/2004 is delivered with a vertical fan unit (sFU-4/2004) installed in the front of the chassis.

Additional components include:

- Rail Kit for rack installation
- Cabling Guide Brackets (optional)
- One power cord per Power Supply
- One console cable
- A grounding kit
- Voltaire Getting Started Short Guide—The Voltaire Solution
- A Product CD

Before beginning installation of the ISR 2012/2004, verify that the package contains the items detailed in the packing list.

Check for loose parts or any visible damage to the contents. If any damaged or missing parts are detected, notify your local Voltaire representative.

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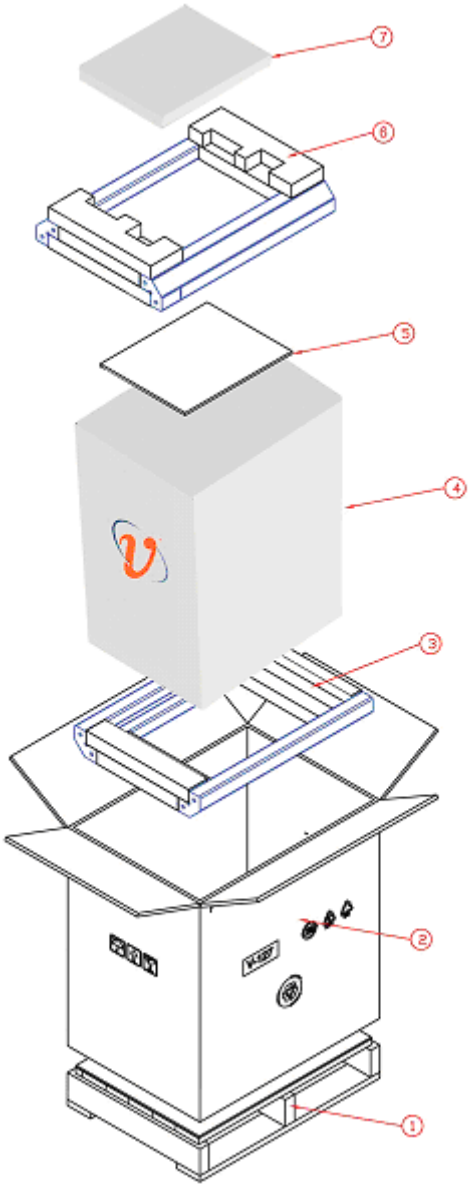

Figure 4-1. Unpacking the ISR 2012 Chassis (Schematic)

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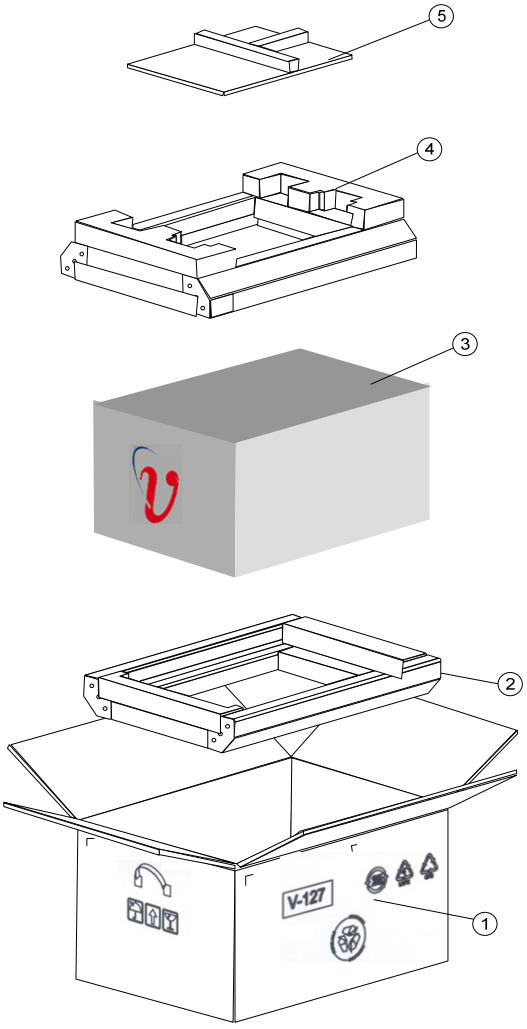

1. Cardboard Box
2. Bottom Foam
3. Switch
4. Top Foam
5. Foam Plate

Figure 4-2. Unpacking the ISR 2004 Chassis (Schematic)

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To unpack the ISR 2012/2004 chassis:

Step 1 Cut the packing straps and open the box.

Step 2 **Unpacking the ISR 2012 chassis:**
Remove the box from around the chassis by sliding it upwards, as shown in Figure 4-3. The ISR 2012 chassis in its partially unpacked state is shown in Figure 4-4.

Figure 4-3. Unpacking the ISR 2012 Chassis

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Figure 4-4. ISR 2012 Chassis Partially Unpacked

Step 2 (cont.) **Unpacking the ISR 2004 chassis:**

The figure that follows illustrates unpacking the ISR 2004 chassis:

Figure 4-5. Starting to Unpack the ISR 2004 Chassis

The upper packing foam covering the ISR 2002/2004 (see Figure 4-4 and Figure 4-5) contains the following components:

- Rail kit
- Cabling guide brackets
- Screw kit
- Grounding kit
- Console cable
- Power cables
- Getting Started Short Guide - Voltaire Solution
- CD with documentation and software utilities fastened on top of the ISR 2012/2004 chassis wrapped in an antistatic bag

Step 3 Remove all of the accessories listed above and as well as the packing foam on top of the chassis.

Step 4 For the ISR 2012: Lift the ISR 2012 from the pallet and place it on a flat surface as in

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Figure 4-4. Due to the weight of the ISR 2012 chassis, two people are required to perform this.

For the ISR 2004: See the schematic in

Figure 4-2. Remove the accessories tray (5 and 4). Then lift the ISR 2012 from the pallet and place it on a flat surface.

CAUTION

Do NOT use the power supply handles for lifting, carrying, or moving the unit. This will damage the handles. When lifting the unit, take extra caution not to damage power supply handles located at the bottom of the unit.

Use safe lifting procedures when moving the unit to avoid personal injury.

4.2 Packing the ISR 2012/2004

You may need to move the ISR 2012/2004 to a different location; should this be necessary, pack the equipment as described below.

To pack the ISR 2012/2004 chassis:

Step 1 For the ISR 2012: Insert the foam grip on the pallet.

Step 2 Position the ISR 2012/2004 chassis on the foam. Make sure the power supplies (rear of the chassis) are on the foam side marked sPSU side, as shown in Figure 4-6. **CAUTION: Do NOT use the power supply handles for lifting, carrying, or moving the unit. This could damage the handles.**

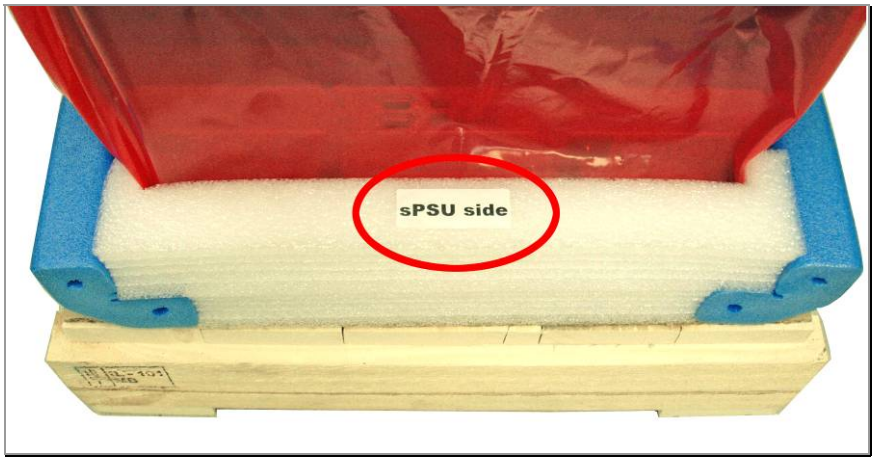

Figure 4-6. (ISR 2012) sPSU Side Label on the Foam

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Step 3 Place the foam plate then the top foam on top of the chassis. The foam protection padding fits snugly over the chassis top.

Step 4 Insert the accessories in the top foam dedicated locations.

Step 5 Slide the cardboard box over the chassis and foam with the flaps facing up.
For ISR 2012: Make sure it sits well on the pallet indent

Step 6 For ISR 2012: Fasten the box and secure it with the pallet using packing straps.
For ISR 2004: close the box and seal it with tape.

NOTE

The packing list and part numbers (bar codes) are glued to the box. Safety labels are printed on the box.

Figure 4-7. ISR 2012 Packed

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Figure 4-8. ISR 2004 Packed

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Chapter 5. Hardware Installation

In This Chapter

This chapter describes how to prepare your site for installation, how to prepare and install the ISR 2012/2004, how to connect network cables, and how to connect the power.

This chapter contains the following sections:

5.1 Preparing for Installation.....5-2
5.2 Rack-Mounting the ISR 2012/2004 Chassis 5-10
5.3 ISR 2012/2004 Power Up.....5-23

5.1 Preparing for Installation

Read the following sections prior to performing the installation.

5.1.1 Tools Required for Installation

The materials and tools required to mount the ISR 2012/2004 chassis into a rack are listed below in Table 3-1.

Table 5-1. Material and Tools Required

Quantity	Description
1	Flat-blade screwdriver
1	Phillips screwdriver
1	Utility knife
1	Measuring tape
1	Crimping tool
1	Wire stripping tool
1	Digital Voltmeter (DVM)
	Floating nuts
	Phillips screws

5.1.2 Site Planning

Planning the proper location and layout of your equipment rack is essential for successful ISR 2012/2004 operation. Equipment placed too close together or in an inadequately ventilated area can cause system over temperature conditions. In addition, poor equipment placement can make system panels inaccessible and difficult to maintain.

To ensure normal operation and avoid unnecessary maintenance, plan your site configuration and prepare your site before installation.

Site Environment Specifications on page 5-3 lists the operational and non-operational environmental site requirements for the ISR 2012/2004. Within specified environmental ranges, the system can continue to operate; however, a measurement that approaches the minimum or maximum of a range indicates a potential problem. You can maintain normal operation by anticipating and correcting environmental conditions before they exceed the maximum operating range. Verify the site power for the type of device you are installing. Power requirements are useful for planning the power distribution system needed to support

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the ISR 2012/2004. Heat dissipation is an important consideration for sizing the air-conditioning requirements for an installation.

See Power Data Specifications Section 3.12 and Chassis Grounding Requirements Section 5.1.6 for ISR 2012/2004 power and heat ratings.

CAUTION

To prevent a loss of input power, verify that the total maximum load on the circuit supplying power to the power supply is within the current ratings of the wiring and breakers.

5.1.3 Rack Requirements

The 15U ISR 2012 chassis and the 15U ISR 2004 chassis are mounted in a standard 19” rack with the sFB and sMB boards facing forward to the rack, and the sLB InfiniBand ports facing to the rear.

For the ISR 2004, the distance between the front and the rear rack rails should not exceed 40” (100 cm).

The rack should support the mechanical and environmental characteristics of a fully populated ISR 2012/2004 chassis as listed in Site Environment Specifications, on page 5-3.

The rack mounting holes conform to the IEA-310 standard for 19-inch racks. Precautions should also be taken to guarantee proper ventilation and ambient temperature is maintained for air intake at the front of the chassis and exhaust in the rack. Racking Rules are detailed in Section 3.11.

5.1.4 Clearance Requirements

Sufficient clearance must be provided around the racks to install and maintain the ISR 2012/2004. Clearance specifications are detailed in Section 3.11.

5.1.5 Site Environment Specifications

Within specified environmental ranges, the system can continue to operate; however, a measurement that approaches the minimum or maximum of a range indicates a potential problem. You can maintain normal operation by anticipating and correcting environmental conditions before they exceed the maximum operating range.

Refer to 3.19 for ISR 2012/2004 operating and non-operating environmental site requirements.

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5.1.6 Chassis Grounding

IMPORTANT

Carefully read the safety warnings at the beginning of this document.

CAUTION

Grounding connection is performed at the customer's site. Connect the chassis to a reliable earth ground. Ensure that the host is connected to earth ground during normal use.

CAUTION

As a rule of thumb, remember that the ground wire should ALWAYS be the FIRST thing you hook up, and the last thing that you disconnect.

CAUTION

Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.

NOTE

The ISR 2012/2004 is delivered with a grounding stud kit. No grounding connection is necessary when fewer than two power supplies are installed.

The grounding kit includes the following items:

- A 10-32 5/8” screw
- 3 spring washers
- 2 nuts #10
- Ground label
- Safety warning label

NOTE

This grounding procedure requires a 10 AWG Grounding Cable.

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Figure 5-1. ISR 2012/2004 Grounding Connection

Figure 5-2. Ground Warning Label

The ISR 2012/2004 provides two grounding options and the ISR 2004 provides four, as shown in Figure 5-3.

For convenience, grounding can be performed from any of these locations.

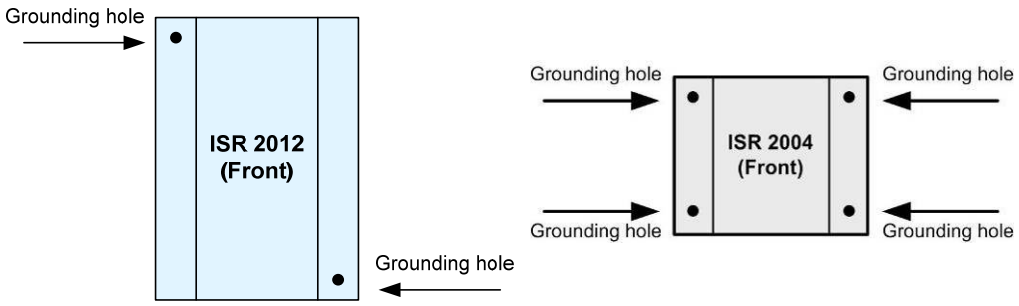

Figure 5-3. Grounding Holes for ISR 2012 and ISR 2004

To install the Grounding Stud:

NOTE

Grounding Stud installation is performed before mounting the ISR 2012/2004 chassis onto the rack.

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Step 1 Insert a 10-32 5/8” screw through the Grounding hole, rear-to-front, as shown in Figure 5-4.

Step 2 Add a spring washer onto the 10-32 5/8” thread, this time front-to rear.

Step 3 Add a nut #10.

Step 4 Add another spring washer.

Step 5 Insert the 10 AWG grounding cable. Connect the other end of the grounding cable to a grounding point at your site.

Step 6 Add another spring washer. Make sure that the grounding cable is tightly secured between the two spring washers.

Step 7 Secure everything with a grounding nut #10.

Step 8 Apply the Ground label under the grounding nut

Step 9 Apply the Safety Warning label on the side of the chassis, near the grounding stud.

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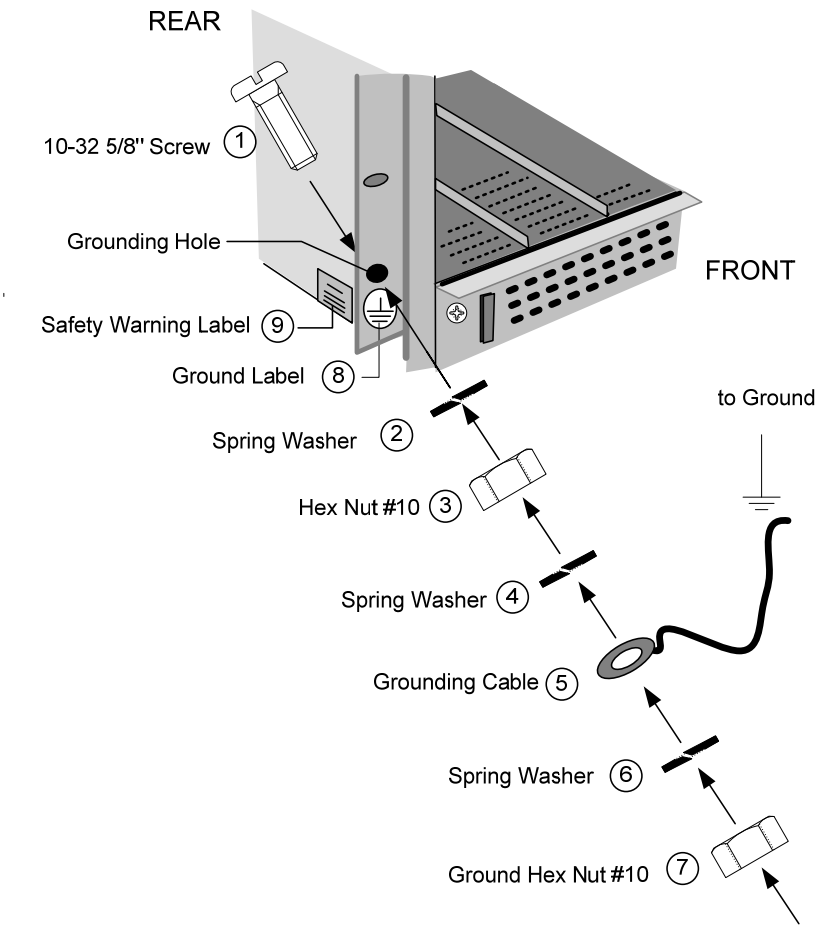

Figure 5-4. ISR 2012/2004 Grounding Stud Installation

5.1.7 Power Requirements

Power requirements are useful for planning the power distribution system needed to support the ISR 2012/2004. Heat dissipation is an important consideration for sizing the air-conditioning requirements for an installation. Verify the available power source at the site for the type of device you are installing.

Refer to Section 3.12 for ISR 2012/2004 power specifications and heat ratings.

CAUTION

To prevent a loss of input power, verify that the total maximum load on the circuit supplying power to the power supply is within the current ratings of the wiring and breakers.

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The ISR 2012/2004 requires multiple power connections using standard 3-wire AC power cords including a safety ground. The input voltage is auto adjusting for 100/240 VAC, 50Hz or 60Hz power connection. If you do not use the power cords supplied by Voltaire, the power cords should be rated for 15A or higher.

The ISR 2012/2004 includes hot swap Power Supply Units (sPSU) with N:1 or N:N redundancy.

A non-redundant power configuration includes the minimum number of power supplies required by the system for operation.

N:N redundancy implies that each non-redundant power supply is fully backed up by a redundant power supply, which is routed to a different power source. This provides for full power backup in case the first power source is disconnected.

N:1 implies that all the system non redundant power supplies are connected to a single power source and are backed up by one spare power supply.

N:M is for spare power supplies. N stands for required units, while M stands for spares. This covers 2:1, as well as 3:2 redundancies.

The ISR 2012 supports up to five load sharing 800W supply modules, the ISR 2004 up to four.

The amount of required power supplies per system is set according to system configuration.

When the ISR 2012 is fully configured, it supports N:1 redundancy, as shown in the example below.

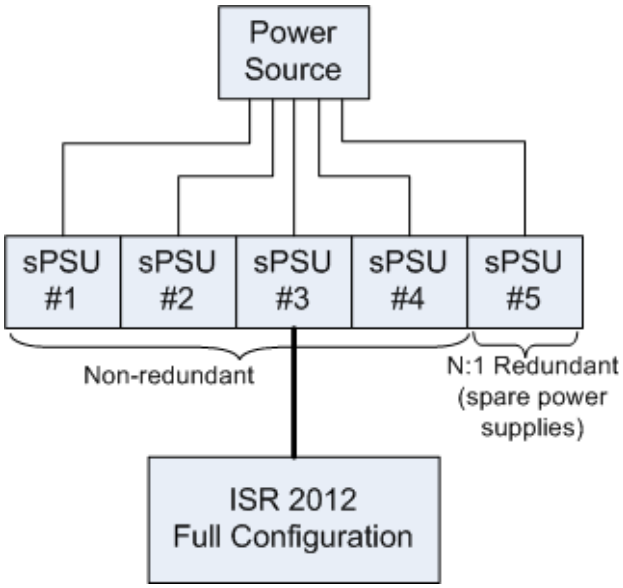

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Figure 5-5. ISR 2012 Fully Configured - N:1 Redundancy

When the ISR 2004 is fully configured, it supports N:N redundancy, as shown in the example below.

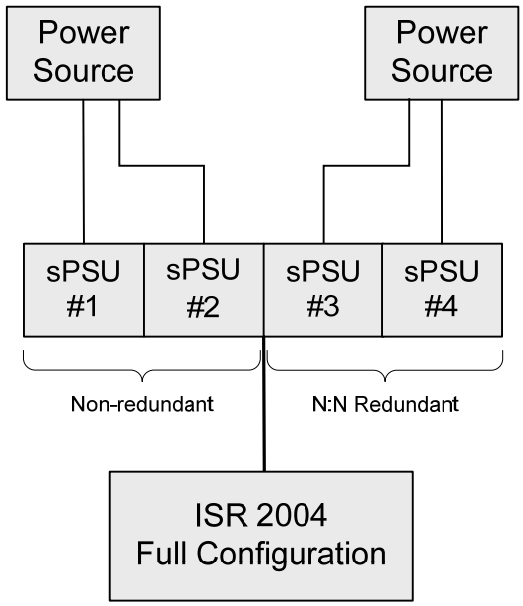

Figure 5-6. ISR 2004 Fully Configured - N:N Redundancy

The tables below illustrate the ISR 2012/2004 N:1, N:N, and N:M redundancies.

Table 5-2. ISR 2012/2004 DDR N:1/N:N Redundancy

Configuration	Modules Included	Non-redundant power supplies	N:1	N:N or N:M
ISR 2012				
24 ports 4x copper	4 sFB-2012, 1 sLB-2024, 1 sFU-8, 1 sFU-4, 1 sCTRL, 1 SMB, 2 sPSU	2	3 (2:1)	4 (2:2)

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Configuration	Modules Included	Non-redundant power supplies	N:1	N:N or N:M
144 ports 4x copper	4 sFB-2012, 6 sLB-2024, 1 sFU-8, 1 sFU-4, 1 sCTRL, 1 SMB, 2 sPSU	2	3 (2:1)	4 (2:2)
288 ports 4x copper	4 sFB-2012, 12 sLB-2024, 1 sFU-8, 1 sFU-4, 1 sCTRL, 2 SMB, 3 sPSU	3	4 (3:1)	5 (3:2)

Configuration	Modules Included	Non-redundant Power Supplies	N:1	N:N or N:M
ISR 2004				
24 ports 4x copper	4 sFB-2004, 1 sLB-2024, 1 sFU-8, 1 sFU-2004, 1 sCTRL, 1 SMB, 2 sPSU	1	2 (1:1)	2 (1:1)
48 ports 4x copper	4 sFB-2004, 2 sLB-2024, 1 sFU-8, 1 sFU-2004, 1 sCTRL, 1 SMB, 2 sPSU	1	2 (1:1)	2 (1:1)
96 ports 4x copper	4 sFB-2004, 4 sLB-2024, 1 sFU-8, 1 sFU-2004, 1 sCTRL, 1 SMB, 2 sPSU	1	2 (1:1)	2 (1:1)

5.2 Rack-Mounting the ISR 2012/2004 Chassis

The ISR 2012/2004 chassis is mounted in a standard 19” rack with the sFBs facing the front of the rack. The ISR 2012/2004 is provided with an adjustable rail kit to accommodate racks of differing depth. The ISR 2012/2004 rail kit is adjustable to accommodate rack depths of 24” (60 cm) to 40” (100 cm).

The mounting process consists of the following steps:

- Assembling and mounting the Rail
- Mounting the chassis on the Rail, in a rack

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CAUTION

Because of the ISR 2012/2004 chassis weight, two people are required to mount this unit in a rack.

5.2.1 Mounting the Cabling Guide Brackets

The Cabling Guide brackets provide a convenient way to arrange the many cables that are connected to a chassis; they are installed on the rear side of the ISR2012 chassis adjacent to the sLB connectors.

Cabling Guide Brackets are optional. If ordered, Cabling Guide Brackets must first be mounted on the rack, as described in Section 5.2, before proceeding with chassis installation.

5.2.2 Assembling and Mounting the Rails

This section shows how to assembling and mounting the rails. This section comprises:

1. List of the rail kit and mounting components
2. Overview of the assembling and mounting procedure
3. Assembling and mounting procedure in detail, the steps accompanied by figures, showing the components as they appear being aligned and then assembled one by one

Rail Kit and Mounting Components

The ISR 2012/2004 package includes:

- A bracket rail kit
- Mounting Ears (or L-Brackets) that are factory installed at the front of the chassis

The supplied Rail brackets are adjustable to allow for mounting the chassis in racks of varying depths.

The Rails can be mounted in several positions along the side of the chassis to further accommodate the depth of the rack. In this way, the chassis can be mounted flush with the rear or the front of the rack facilitating access to the InfiniBand connectors and power connections.

The rail bracket kit includes the following items:

- Left bracket (left Rail)
- Right bracket (right Rail)
- 2 Inserts (with elongated holes) – same for both Rails
- 8-32 Screws 5/8” (Qty: 2 x 8)
- 8-32 Screws 3/8” (Qty: 2 x 3)

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- 8-32 Nuts (Qty: 2 x 8)
- M4 Flat Washers (Qty: 2 X 8)
- Spring Washers (Qty: 2 x 8)

NOTE

Voltaire does not provide clip nuts.

Overview of Assembling the Rail Kit

This overview presents the appearance of the assembled rail kit and summarizes the main steps of the procedure for assembling the rail kit. First is shown a picture of the completed assembly, so that you will have in mind a clear image of your objective, and then follows the procedure summary.

The following image shows the two rails completely assembled and how the left rail looks when it is attached to the rack.

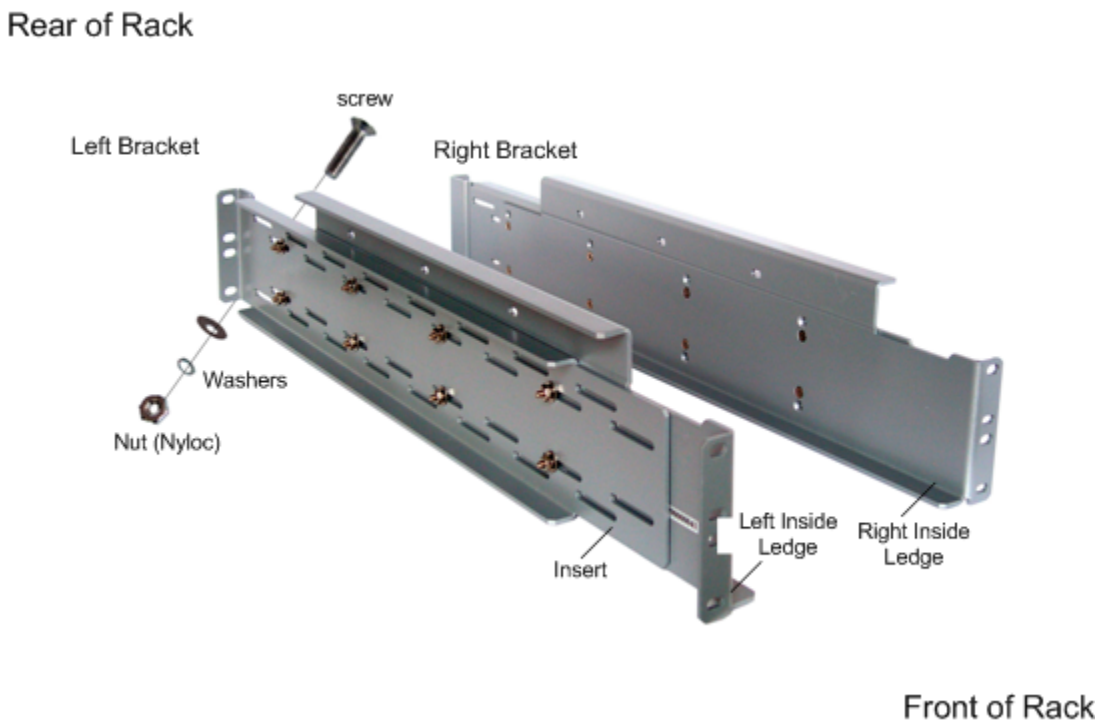

Figure 5-7. Overview of Assembled Rail Kit

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Notes:

1. Use all 8 screws. Note the order of the nuts and washers.
2. User all the inner opening sets (as shown in the photo) or other openings, depending on the Rack vertical rails locations.

Inside ledges are used for sliding the chassis along the rail.

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Procedure Summary

Perform each step of the following procedure for both rails.

1. Use 8-32 5/8” screws and flat washers and spring provided with the kit to assemble the Rail, positioning the insert in front of the bracket.
2. For each of left and right rails, take a bracket and attach an insert (the two inserts are identical). At this stage, position the two parts to fit the distance between the rack rails of each side.

NOTES

Make sure that you are using the right bracket for the right Rail (right side when facing the front of the rack) and the left bracket for the left Rail (left side when facing the front of the rack).

The insert is identical for both Rails.

The rail supports six or eight 8-32 5/8” screws. Eight is recommended.

3. Select the threaded holes in the bracket.
4. Assemble the Rail with flat washers, spring washers, and nuts.
5. Do not tighten the screws at this time.
6. Align the Rail mounting holes with the mounting holes in the equipment rack.
7. Install the rail kit according to one of the two options listed below:

a. Aligned with the U mark

Position the Rail Brackets in perfect alignment with the “U” mark on the Rack (requires 1U clearance below).

b. Above the U mark

Position the Rail Brackets and align them with the hole above the “U” mark on the Rack (no need for 1U clearance below).

8. Attach the front side of the Rail to the rack’s front vertical side rail with 4 screws and the rear side of the Rail to the rack’s rear vertical side rail with 4 screws.

IMPORTANT

This is an important step. If you do not tighten the screws, the chassis cannot be transported safely!

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9. Repeat steps 1 to 3 to assemble the other Rail and mount it on the other side of the chassis; the Rails are now ready for chassis installation.

IMPORTANT

When mounting the rail ensure box-to-box vertical alignment on all four rack rails. See that the bottom side of the rail is aligned with the 1U marking on the rack rail.

At some future date a template will be provided to facilitate installation.

Rail Kit Assembling Procedure in Detail

This section presents the detailed procedure for assembling and mounting. Each step is accompanied by a figure, showing the components as they appear being aligned and then assembled one by one.

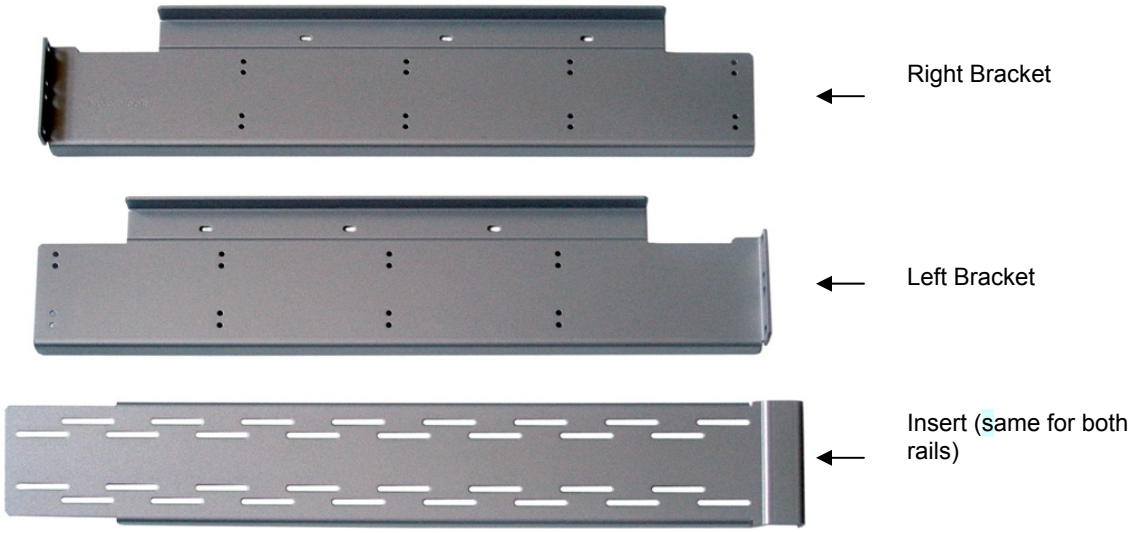

Figure 5-8. Rail Brackets (Left Bracket (top), Right Bracket (center), and Insert (bottom)

In addition, eight screw sets are included, comprising one screw, one nut, and two washers.

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To assemble the Rail:

Step 1

a. Use 8-32 5/8” screws and flat washers and spring provided with the kit to assemble the Rail, positioning the insert in front of the bracket as displayed in Figure 5-9 and Figure 5-10 below.

b. For each of left and right, take a bracket and attach an insert (the two inserts are identical). At this stage, position the two parts to fit the distance between the rack rails of each side.

NOTES

Make sure that you are using the right bracket for the right Rail (right side when facing the front of the rack) and the left bracket for the left Rail (left side when facing the front of the rack) – see Figure 5-8.

The insert is identical for both Rails.

The rail supports six or eight 8-32 5/8” screws. Eight is recommended.

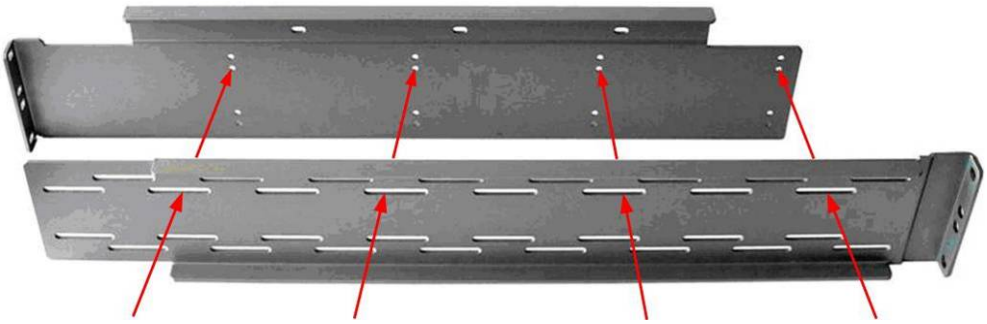

Figure 5-9. Positioning the Insert in Front of the Right Bracket

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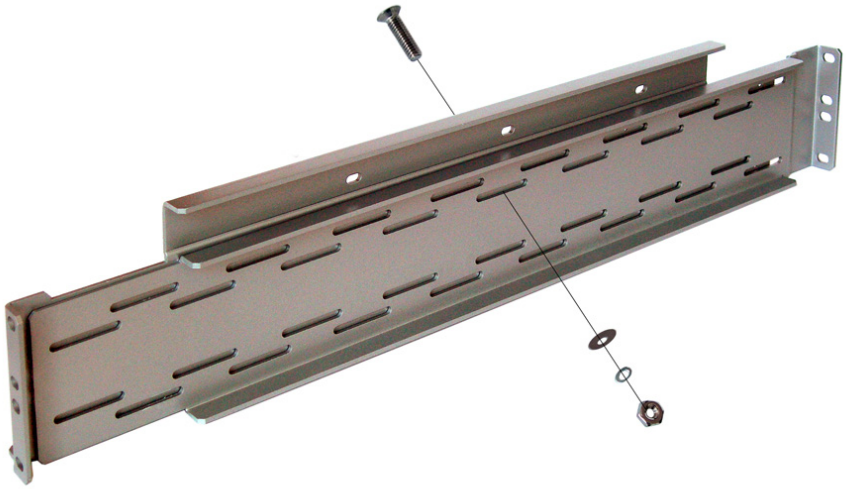

Front side **Rear side**

Figure 5-10. Assembling the Rail Bracket

a. Select the threaded holes in the bracket.
b. Assemble the Rail with flat washers, spring washers, and nuts.
c. Do not tighten the screws at this time.

Rear side **Front side**

Figure 5-11. Right Rail Assembly (top) and Left Rail Assembly (bottom)

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Step 2

a. Align the Rail mounting holes with the mounting holes in the equipment rack as displayed in Figure 5-12 and Figure 5-13.

b. Install the rail kit according to one of the two options listed below:

1. Aligned with the U mark:

Position the Rail Brackets in perfect alignment with the “U” mark on the Rack (requires 1U clearance below).

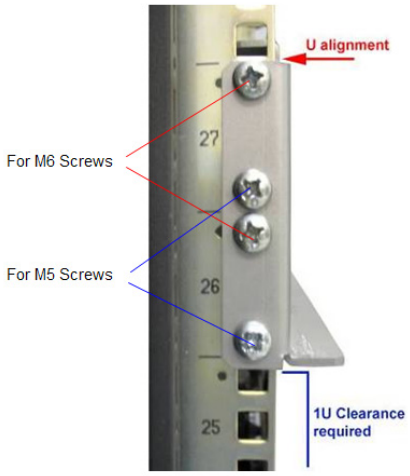

Figure 5-12. U Alignment

2. Above the U mark:

Position the Rail Brackets and align them with the hole above the “U” mark on the Rack (no need for 1U clearance below).

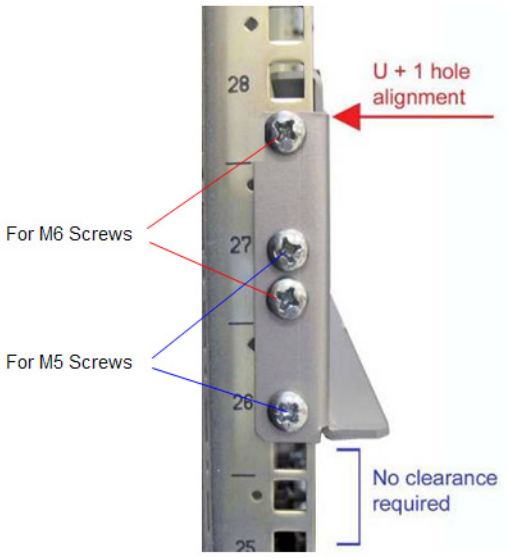

Figure 5-13. Above U Alignment

c. Attach the front side of the Rail to the rack’s front vertical side rail with 2 screws and the rear side of the Rail to the rack’s rear vertical side rail with 2 screws.

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The following figure shows the left rail completely assembled and how it looks when it is attached to the rack.

Figure 5-14. Mounting the Rail. Rear view of Left Rail

Figure 5-15. Mounting the Rail. Front view of Left Rail

Step 3 Go back and tighten the screws that were used to connect the two parts of the Rail in Step 1.

NOTE

This is an important step. If you do not tighten the screws, the chassis cannot be transported safely!

Step 4 Repeat steps 1 to 3 to assemble the other Rail and mount it on the other side of the chassis; the Rails are now ready for chassis installation.

IMPORTANT

Ensure box-to-box vertical alignment in all four connections. See that the bottom side of the rail is aligned with the 1U marking on the rack rail.

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5.2.3 Mounting the ISR 2012/2004 in a Rack

This section shows how to mount the ISR 2012/2004 in a rack.

NOTE

The rack mounting procedure presented in the following is for both the ISR 2012 and the ISR 2004.

NOTE

Screws and Clip nuts to connect the Chassis to the Rack and Rail kit to Rack are not supplied by Voltaire.

CAUTION

Make sure that the grounding stud is installed before performing the steps below (see Chassis Grounding, on page 5-4).

To install the ISR 2012/2004 chassis:

Step 1

a. Lift the chassis and place it on the Rails, with front of the chassis towards you, as shown below.

b. Slide the chassis into place.

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Figure 5-16. Mounting the ISR 2012/2004 Chassis in a Rack

Step 2

a. Secure the chassis onto the rack by aligning the holes in the front of the chassis with the mounting holes in the equipment rack's vertical front rail.

b. Secure the chassis through the holes in the Front Rack Rail using eight screws for the ISR 2012 or four screws for the ISR 2004 and adequate clip nuts.

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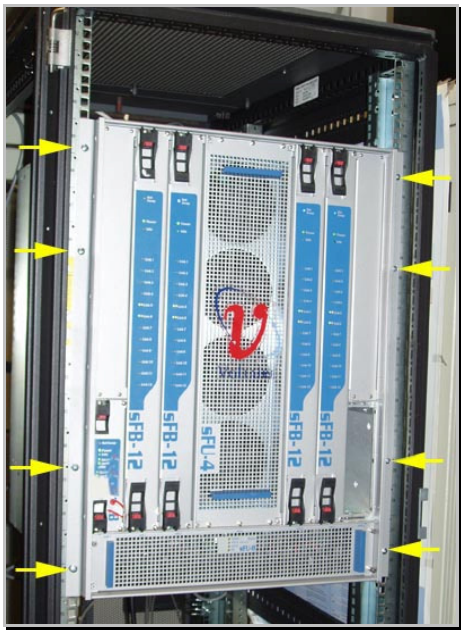

Figure 5-17. Securing the ISR 2012 Chassis onto the Front Rack Rail

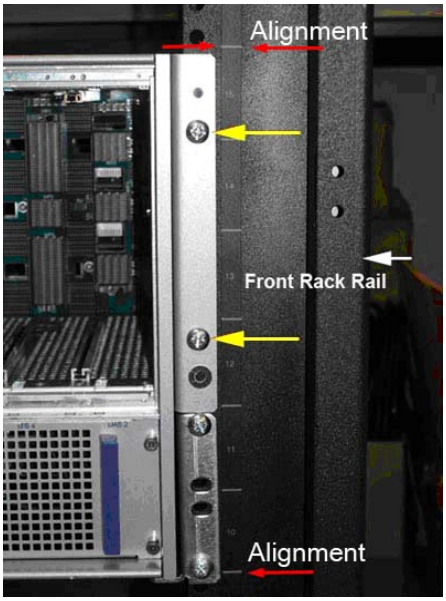

Figure 5-18. Securing the ISR 2004 Chassis onto the Front Rack Rail

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Step 3 To further stabilize the chassis for transport, secure the ISR 2012/2004 chassis onto the Rail by using three 8-32 Screws 3/8" through the recessed holes and into the threaded holes in the chassis side walls (see Figure 5-19).

Once the rack is installed on premise, these screws should be taken away to allow chassis removal in case the sides of the rack are not accessible.

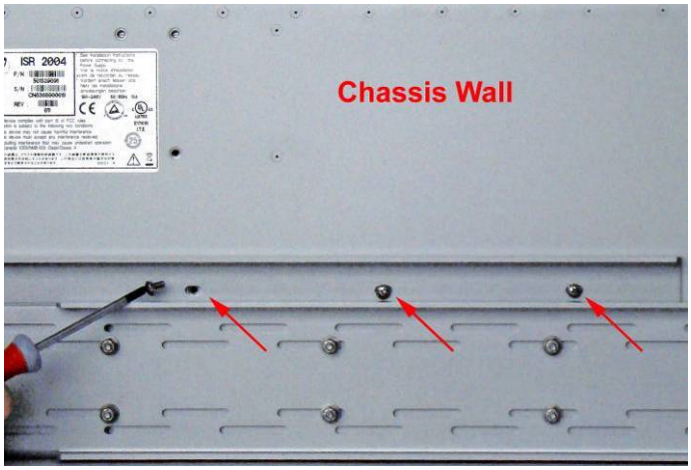

Figure 5-19. Securing the ISR 2012/2004 Chassis for Transport

5.3 ISR 2012/2004 Power Up

Once the ISR 2012/2004 chassis is secure within the rack, electrical cables from the power distribution source can be fitted in preparation for connection.

Power cords are supplied by Voltaire according to the system configuration, one per power supply unit.

NOTE

Verify that you have the correct number of power supply modules installed.

Step 1 Ensure that all site power and grounding requirements have been met before connecting the chassis to a power source.

Step 2 Before turning on the power, verify that all boards, power supplies, and fan tray modules are properly inserted.

Step 3 Connect the power supply cords to the AC connectors located at the rear of the chassis.

All LED indicators on the sFB and sLB briefly light up and then turn off just after power is turned on.

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This is a normal part of the power on initialization sequence. After initialization is completed, the link LED indicators on the sFB and sLB are in a state representing the link status of their corresponding ports.

If there are not enough sPSUs installed, the system won't power up or in some cases, only part of the system will power up and other parts will remain unpowered.

Determine the minimum number of PSU required and to add at least 1 PSU as redundant (N:1) or full redundant (N:N), using the method described in Section 0.

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Chapter 6. Installing System Boards

In This Chapter

This chapter describes installation of the system boards in the Voltaire ISR 2012/2004 chassis.

This chapter contains the following sections:

6.1 Chassis Board Configuration 6-2
6.2 Inserting/Extracting Boards 6-6
6.3 Installing the Fabric Board (sFB) 6-8
6.4 Installing the Line Board (sLB-2024) 6-12
6.5 Installing the sRB-20210G Module 6-14
6.6 Installing the High-Memory Management Board (sMB) 6-17
6.7 Installing the Power Supply Unit (sPSU) 6-19
6.8 Installing the sRBD-20 Router Blade Drawer 6-20
6.9 Installing the IP Router Modules 6-22
6.10 Control Board (sCTRL) 6-24
6.11 Fan Units (sFUs) 6-25

6.1 Chassis Board Configuration

Boards must be installed in their designated slot to enable their full functionality. All boards are hot swappable and therefore can be inserted and extracted without turning off electrical power on the ISR 2012/2004 chassis.

The ISR 2012/2004 chassis is factory pre-assembled with fan units and rear panel sCTRL board. Additional boards and modules are shipped according to the system configuration and are added during installation. Refer to System Configurations on page 2-1 for a list of the possible chassis configurations.

NOTE

Every slot that is not populated with a module must be covered with a blank panel for proper cooling.

6.1.1 ISR 2012 Chassis

The front panel of a Grid Director ISR 2012 includes:

- Four slots for Fabric Boards (sFB-2012)
- Two slots for Management boards (sMB)
- sFU-8 fan units
- sFU-4 fan units

The front panel of a fully populated ISR 2012 chassis is shown in Figure 6-1.

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Figure 6-1. Front View of ISR 2012 Chassis

The rear panel of a Grid Director ISR 2012 includes:

- 12 slots which can be filled with sLBs, sRB-20210G, or with 11 sRBD-20s and one sLB
- Five bays for power supply modules (The power supplies can be installed in any of the bays, without restriction)
- One slot for the sCTRL board

The rear panel of an ISR 2012 chassis fully populated with 12 line boards (288 ports) is shown in Figure 6-2.

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Figure 6-2. Rear View of ISR 2012 Chassis with 12 sLBs

6.1.2 ISR 2004 Chassis

The front panel of a Grid Director ISR 2004 includes:

- Four slots for Fabric Boards (sFB-2004)
- Two slots for Management boards (sMB)
- sFU-8 fan unit
- sFU-2004 fan unit

The front panel of a fully populated ISR 2004 chassis is shown in Figure 6-3.

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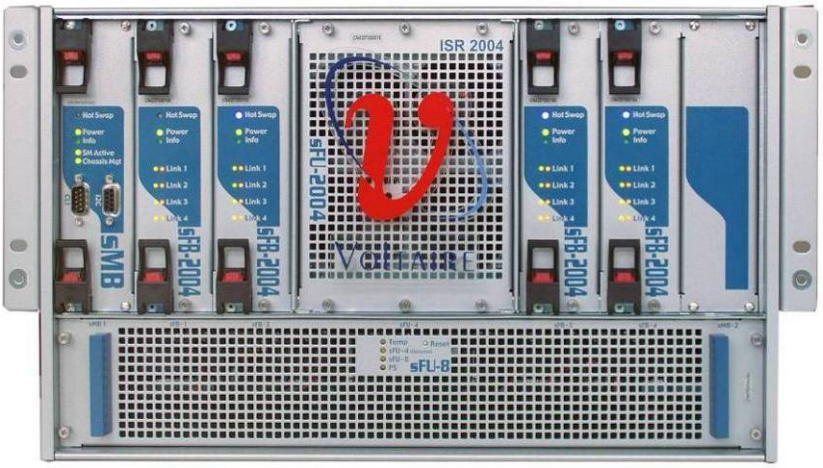

Figure 6-3. Front View of ISR 2004 Chassis

The rear panel of a Grid Director ISR 2004 includes:

- 4 slots which can be filled with sLBs , sRB-20210Gs, or with sRBD-20s
- Four bays for power supply modules (The power supplies can be installed in any of the bays, without restriction)
- One slot for the sCTRL board

The rear panel of an ISR 2004 chassis fully populated with 2 sLBs (48 ports), an sRBD-20, and an sRB-20120G is shown in Figure 6-4.

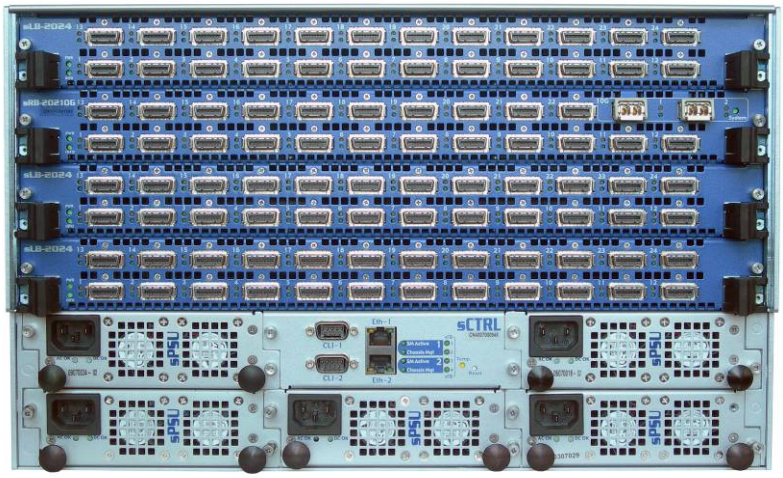

Figure 6-4. Rear View of ISR 2004 Chassis with an sRB-20210G

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6.2 Inserting/Extracting Boards

CAUTION

When handling electronic boards, wear grounding wrist straps to avoid ESD damage to the card. Do not directly touch the Midplane with your hand or any metal tool, or you could shock yourself.

sFBs, sMBs, and other ISR 2012/2004 boards have a pair of ejectors that lock the board in place and serve as a lever for seating or extracting.

The ejectors snap inward to lock the board into place and may include a red button to disengage the lock and electrically notify the system that an extraction has been requested. (Note that sLB-2024 ejectors do not have this red button) The blue hot swap LED indicates when the board is ready to be removed.

Figure 6-5 illustrates the ejectors action.

Four screws on each board complete the seating and lock of the board in place.

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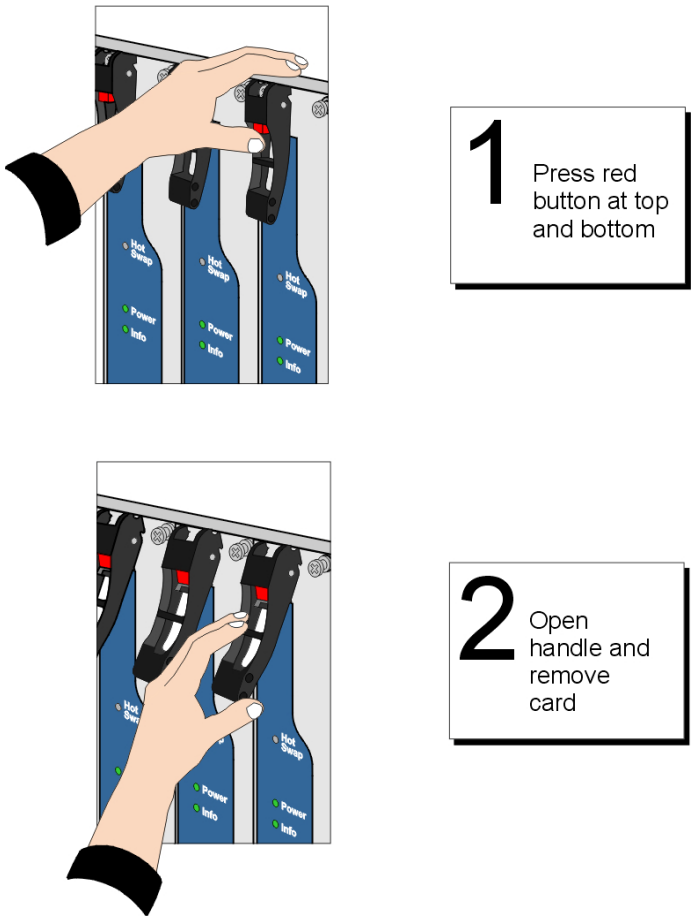

Figure 6-5. Using Ejectors to Extract a Board

TIPS

The following are some tips that will make insertion of boards into the ISR 2012/2004 chassis easier to perform:

The ejectors have an integrated guide pin that slides into a groove in the chassis. Should the guide pin be not perfectly aligned with the groove, the installer may experience difficulty in locking the ejector handles in place. When this occurs, try to jiggle the ejector handle until it locks into place.

It is recommended to tighten the screws in a criss-cross sequence (top right, bottom left, top left, bottom right.)

Refer to the Torque Section 3.9 for torque specifications.

When inserting the screws, make sure that they are inserted directly into their groove, and that they slide in easily. It is recommended to start the insertion manually, to ensure that the insertion is correct.

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CAUTION

When using an electric screwdriver to fasten the board screws in place, do not use more than Torque 3 force as this could damage the screws.

6.3 Installing the Fabric Board (sFB)

Up to four sFBs can be installed at the front of the ISR 2012/2004 chassis to achieve a fully non-blocking system.

sFB installation depends on the sMB location. sFBs can essentially be installed in any of the four slots. However, since the sMB runs the Subnet Manager and the chassis management (DM) via the sFB-2012 card adjacent to it, the sFBs should first be installed right next to the sMB, namely in slot 1 and/or in slot 4.

NOTE

Make sure that each sMB has an sFB installed right next to it. (The sMB runs GridVision via the sFB-2012 card adjacent to it). The sFB adjacent to the master sMB may not be removed during operation.

The front panel of the ISR 2012 sFB-2012 Fabric Board is shown in Figure 6-6. The front panel of the ISR 2004 sFB-2004 Fabric Board is shown in Figure 6-6.

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Figure 6-6. ISR 2012 sFB-2012 Fabric Board

Figure 6-7. ISR 2004 sFB-2004 Fabric Board

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Table 6-1 lists and describes the ISR 2012/2004 sFB-12 Fabric board LEDs.

Table 6-1. ISR 2012/2004 sFB LED Description

Indication	LED Description	ISR 2012/2004
Link	Each pair of LEDs indicates the state of ports of each sLB. The two LEDs in each pair are: • Green – ON indicates physical link up • Amber – ON indicates logical link up The LED states are: • LED OFF–no link detected on any of the 6 sLB ports (Line Board missing) • LED ON – all 6 ports have a link • LED blinking - Green – indicates errors - Amber – indicates data	Each pair of LEDs indicates the state of six 4X ports of each sLB. [six 4X ports links mean that this product is internally connected between sLBs and sFBs with 4X links)]
Power (Green)	• ON – indicates that all board voltage levels are operating normally • OFF – indicates a problem in a board's power supply	
Hot Swap (Blue)	Indicates when the board can be extracted. • ON – indicates that the board can be extracted • OFF – indicates that the board cannot be extracted	
Info	General purpose LED for management usage	

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To insert an sFB into the chassis:

Step 1 Verify that the ejectors are unlocked by pressing the red button.

Step 2 Carefully seat the board into the side guide rails.

Slowly slide the board into the chassis until the ejectors begin to engage on the chassis edge. When sliding in the board, do so by pushing at the center of the board front panel and not by pushing the ejectors.

Make sure that the front panel of the Fabric board is completely vertical, is pushed all the way in and is level with the front panel of the chassis.

Step 3 Press the ejectors inward until the locks snap. Perform this step gently.

CAUTION

Use caution when inserting Fabric boards; lock ejectors in place gently.

Step 4 Tighten the four security screws. It is recommended to tighten the screws in a criss-cross sequence (top right, bottom left, top left, bottom right).

Step 5 Verify the following LED conditions:

- Power LED: ON
- Info LED: OFF

To extract an sFB from the chassis:

Step 1 Release the security screws.

Step 2 Press the red tabs to unlock the ejectors.

Step 3 Wait for the Blue Hot Swap LED to light.

Step 4 Press the ejectors outwards and slowly slide out the board.

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6.4 Installing the Line Board (sLB-2024)

Up to 12 Line Boards (sLB-2024) can be installed at the rear side of the ISR 2012 chassis and up to 4 Line Boards at the rear of the ISR 2004.

One set of ASICs is routed to the lower twelve ports, the "lower ASICs" and the other set is routed to the upper twelve ports, the "upper ASICs". The InfiniBand ports are numbered from 1-12 (from left to right) on the bottom row for the lower ASIC chips and 13 to 24 (from left to right) on the top row for the upper ASIC chips.

The front panel of the sLB-2024 Line Board is shown in Figure 6-8.

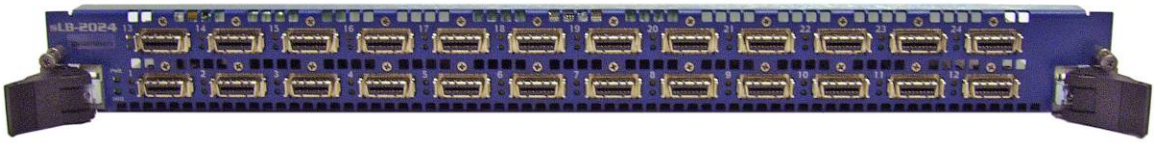

Figure 6-8. Line Board (sLB-2024)

Table 6-2 lists and describes the sLB LEDs.

Table 6-2. sLB LED Description

Indication	Description
Link State	Indicates the state of the 4X connectivity. The two LEDs in each pair are: - Green – ON indicates physical link up - Amber – ON indicates logical link up The LED states are: - LED OFF – no link detected - LED ON – there ports has a link - LED blinking - Green – indicates errors - Amber – indicates data activity Blinking green Link State LED often indicates a faulty InfiniBand cable connection (e.g., loose contact) or a faulty InfiniBand cable. Refer to Chapter 9 on System Cabling for tips on how to avoid this occurrence.
Power (Green)	ON – indicates that all board voltage levels are operating normally OFF – indicates a problem in power supply to the board
Info	General purpose LED for management use

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To insert an sLB into the chassis:

NOTE

When installing the sLBs, start at the bottom of the chassis and work your way up to avoid friction between components of adjacent sLBs.

Step 1 Carefully seat the board into the side guide rails. Slowly slide the board into the chassis until the ejectors begin to engage on the chassis edge. **Do not exert excess force on the connectors when inserting the sLB.**

Step 2 Press the ejectors inwards until the locks snap.

Step 3 Tighten the two security screws.

Step 4 Verify the following LED conditions:
- Power LED: ON
- Info LED: OFF

To extract an sLB from the chassis:

Step 1 Disconnect all cables.

Step 2 Release the security screws.

Step 3 Press the ejectors outwards and slowly slide out the board.

NOTE

sLB-2024 cards include new Ejectors without the red locker.

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6.5 Installing the sRB-20210G Module

Up to 12 sRB-20210G modules can be installed at the rear side of the ISR 2012 chassis and up to 4 sRB-20210G modules at the rear of the ISR 2004.

The InfiniBand ports are numbered from 1-12 (from left to right) on the bottom row for the lower ASIC chips, and 13 to 22 (from left to right) on the top row for the upper ASIC chips.

The front panel of the sRB-20210G module with 4X InfiniBand ports and 2X 10gE ports is shown in is shown in Figure 6-9.

Figure 6-9. sRB-20210G Module

Table 6-3 lists and describes the sRB-2012G LEDs.

Table 6-3. sRB-2012G LED Description

Indication	Description

IB Link State	Indicates the state of the 4X connectivity.
	The two LEDs in each pair are:
	- Green – ON indicates physical link up
	- Amber – ON indicates logical link up
	The LED states are:
	- LED OFF – no link detected
	- LED ON – there ports has a link
	- LED blinking
	  - Green – indicates errors
	  - Amber – indicates data activity
	Blinking green Link State LED often indicates a faulty InfiniBand cable connection (e.g., loose contact) or a faulty InfiniBand cable. Refer to Chapter 9 on System Cabling for tips on how to avoid this occurrence.

Power (Green)	- ON – indicates that all board voltage levels are operating normally - OFF – indicates a problem in power supply to the board
Info	General purpose LED for management usage

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Indication	Description
10GbE Link State	Indicates the state of the 10GbE connectivity. The two LEDs in each pair are: - Green – ON indicates physical link up - Amber – ON indicates traffic The LED states are: - LED OFF – no link detected - LED ON – the port has a link - LED blinking amber – indicates data activity
System	10GbE System state: - LED OFF – 10GbE system is down - LED ON – System is active Blinking slow – System is initiating Blinking fast – System fault; software in primary mode

To insert an sRB-20210G into the chassis:

NOTE

Before inserting an sRB-20210G module into the switch verify that the version of the switch software is v5.2 or higher.

A warning tag is attached to each sRB-20210G module (see following figure). Remove the tag only after verifying that the correct software is installed on the switch or after upgrading the switch to the correct version.

Figure 6-10. Warning Tag

NOTE

When installing the sRB-20210G, start at the bottom of the chassis and work your way up to avoid friction between components of adjacent sRB-20210G modules.

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Step 1 Carefully seat the board into the side guide rails. Slowly slide the board into the chassis until the ejectors begin to engage on the chassis edge. **Do not exert excess force on the connectors when inserting the sRB-20210G.**

Step 2 Press the ejectors inwards until the locks snap.

Step 3 Tighten the two security screws.

Step 4 Verify the following LED conditions:
- Power LED: ON
- Info LED: OFF

To extract an sRB-20210G from the chassis:

Step 1 Disconnect all cables.

Step 2 Release the security screws.

Step 3 Press the ejectors outwards and slowly slide out the board.

NOTE

sRB-20210G modules include new Ejectors without the red locker.

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6.6 Installing the High-Memory Management Board (sMB)

You can either install one or two sMB in the front of the ISR 2012/2004 chassis.

The front panel of the sMB board is shown in Figure 6-11.

Figure 6-11. sMB Management Board

The sMB board provides two RS-232 ports, one (I^2C port) for debug use by authorized personnel only; the second port (CLI) can be used to establish a CLI connection locally to the chassis.

Each ISR 2012/2004 chassis can be installed with one or two redundant sMB boards. At a given time, only one sMB is operating as a master (active) while the other board is in standby mode (passive).

NOTE

The sMB runs the Subnet Manager and the chassis management (DM) via the sFB-12/sFB-4 card adjacent to it. The sMB can not function if the adjacent sFB-2012 is missing. This also holds for configurations with two sMBs, so if two sMBs are installed, the two adjacent sFB-2012 cards must be installed as well.

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Table 6-4 lists and describes the sMB board LEDs.

Table 6-4. sMB LED Description

Indication	Description
Hot Swap (Blue)	Indicates when the board can be extracted: ON – indicates that the board can be extracted OFF – indicates that the board cannot be extracted
Power (Green)	ON – indicates that all board voltage levels are operating normally OFF – indicates a problem in board's power supply
Info	General purpose LED for management use (Green).
SM Active (Green)	Indicates that the Subnet manager is running on the specific sMB. Blinking indicates standby mode.
CM Active (Green)	Indicates that the Chassis Management is running on the specific sMB.

To insert an sMB into the chassis:

Step 1 Verify that the ejectors are unlocked by pressing the red button.

Step 2 Carefully seat the board into the side guide rails. Slowly slide the board into the chassis until the ejectors begin to engage on the chassis edge.

Step 3 Press the ejectors inwards until the locks snap.

Step 4 Tighten the four security screws. It is recommended to tighten the screws in a criss-cross sequence (top right, bottom left, top left, bottom right).

Step 5 Verify the following LED conditions:
- Power LED: ON
- Info LED: OFF
- Hot Swap LED: OFF

IMPORTANT

The sMB will not operate properly unless the ejectors are fully locked. Press them inwards until you hear the "click".

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To extract an sMB from the chassis:

Step 1 Disconnect CLI and I2C cables from the specific board.

Step 2 Release the security screws.

Step 3 Press the red tabs to unlock the ejectors.

Step 4 Wait for the Blue Hot Swap LED to light.

Step 5 Press the ejectors outwards and slowly slide out the board.

6.7 Installing the Power Supply Unit (sPSU)

Power Supply modules are installed in the rear of the ISR 2012/2004 chassis. Ideally, each Power Supply module line cord should be connected to a different circuit for maximum fault tolerance in the event of power problems.

Please refer to the Safety section at the beginning of this manual before connecting the power supplies to mains.

The front panel of the Power Supply module is shown in Figure 6-12.

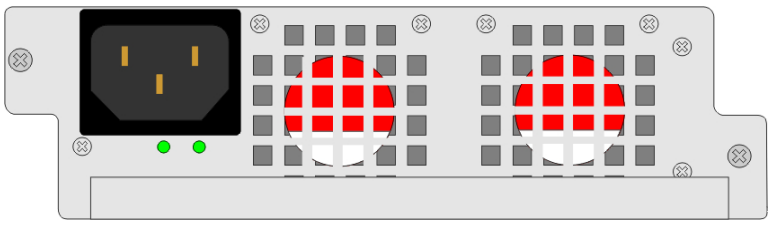

Figure 6-12. Power Supply Unit (sPSU)

Table 6-5 lists and describes the Power Supply module LEDs.

Table 6-5. sPSU LED Description

Indication	Description
DC ON (Green)	On – Indicates that the DC power source is present.
AC ON (Green)	On – Indicates that the AC power source is present.

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To insert an sPSU into the chassis:

Step 1 Carefully seat the unit into the designated slot. Slowly slide the unit into the chassis until the unit is completely engaged on the chassis edge.

Step 2 Tighten the screws.

IMPORTANT

Please verify that you have the correct number of power supplies installed when powering up the system. Using fewer than the required power supplies for your specific configuration may cause malfunction.

All power supplies must be powered simultaneously. If not powered simultaneously, the system may not start properly.

To extract an sPSU from the chassis:

Step 1 Disconnect power cable.

Step 2 Loosen the screws.

Step 3 Extract the sPSU by pulling the handle.

6.8 Installing the sRBD-20 Router Blade Drawer

Router Blade Drawers (sRBD-20) can host up to two IPR (TCP/IP router) modules.

A Router Blade Drawer including two IPR modules is shown in Figure 6-13.

Figure 6-13. sRBD-20 Router Blade Drawer

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6.8.1 Installation Procedures

To insert an sRBD-20 into the chassis:

Step 1 Verify that the ejectors are unlocked by pressing the red button.

Step 2 Carefully seat the sRBD-20 into the side guide rails. Slowly slide the sRBD-20 into the chassis until the ejectors begin to engage on the chassis edge.

Step 3 Press the ejectors inwards until the locks snap.

Step 4 Tighten the four security screws. It is recommended to tighten the screws in a criss-cross sequence (top right, bottom left, top left, bottom right).

To extract an sRBD-20 from the chassis

Step 1 Release the security screws.

Step 2 Press the red tabs to unlock the ejectors.

Step 3 Press the ejectors outwards and slowly slide out the sRBD-20.

6.8.2 IPR Description

The IPR TCP/IP Router Blade module, shown in Figure 6-14, contains four small form-factor SFP GbE ports, providing a fast link to an IP network for devices on the InfiniBand fabric, and a Management port. The GbE interface can be configured to a multitude of connection types (e.g., MTRJ, FC, LC, or Copper) by replacing the SFP module. A Link/activity status LED is located next to each GbE port.

The IPR has three LEDs on the face of the module, indicating link status of the combined interfaces in the integrated Management port and overall system status.

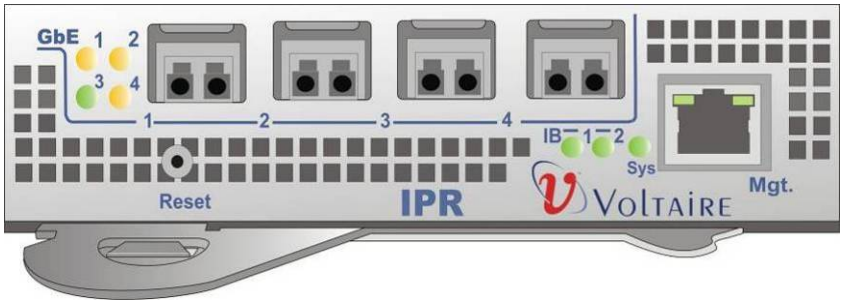

Figure 6-14. IPR Module

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Table 6-6 lists the IPR LED descriptions.

Table 6-6. IPR Module LEDs

LED	Color	Description
Link/Act	Green – blinking	Port is operational and Ethernet packets are being received.
System	Green-steady	Boot sequence is completed and system is operational.
	Green-blinking	Boot sequence initiated and in-process.
GbE	Green-blinking	Port is operational and Ethernet packets are being received.
InfiniBand	Amber	Port is operational and a physical link exists between the port and the InfiniBand fabric.
	Green	Port is operational and has a logical connection to the InfiniBand fabric.

6.9 Installing the IP Router Modules

To install a router module inside one of the sRBD-20 slots, slide in the module and fasten by pressing in the lock-handle. Reverse the procedure for removal.

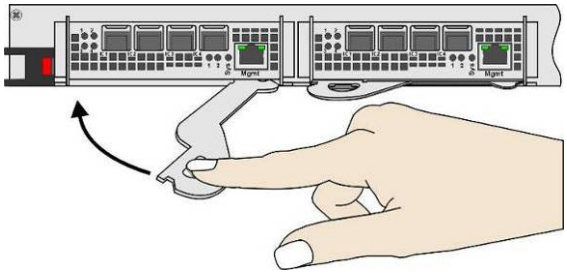

Figure 6-15. Inserting/Removing the IP Router Modules

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CAUTION

This product may contain sealed lead acid, nickel cadmium, nickel metal hydride, lithium, or lithium ion battery. The battery must be recycled or disposed of properly. Recycling facilities may not be available in your area. Batteries or packaging for batteries are labeled in accordance with European Directive 2006/66/EC concerning batteries and accumulators and waste batteries and accumulators. The Directive determines the framework for the return and recycling of used batteries and accumulators as applicable throughout the European Union.

For Taiwan:

Please recycle batteries

廢電池請回收

This mark applies only to countries within the European Union (EU)

This label is applied to various batteries to indicate that the battery is not to be thrown away, but rather reclaimed upon end of life per this Directive.

In accordance with the European Directive 2006/66/EC, batteries and accumulators are labeled to indicate that they are to be collected separately and recycled at end of life. The label on the battery may also include a chemical symbol for the metal concerned in the battery (Pb for lead, Hg for mercury and Cd for cadmium). Users of batteries and accumulators must not dispose of batteries and accumulators as unsorted municipal waste, but use the collection framework available to customers for the return, recycling and treatment of batteries and accumulators. Customer participation is important to minimize any potential effects of batteries and accumulators on the environment and human health due to the potential presence of hazardous substances.

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6.10 Control Board (sCTRL)

The sCTRL board, shown in Figure 6-16, is installed on the rear panel of the ISR 2012/2004 chassis. It provides the ISR 2012/2004 system user interface of the management ports (Ethernet and Serial). It also includes a Reset button for the chassis.

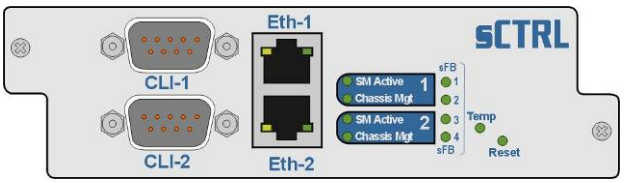

Figure 6-16. sCTRL Board

The sCTRL card provides the following LED indications:

Table 6-7. sCTRL Board LEDs

Indication	Description
sFB1 to 4 (Green)	Indicates the presence of an sFB in the chassis. Each LED corresponds to one sFB slot: ON – indicates that an sFB is installed OFF – indicates that no sFB is installed
Temp (Orange)	Indicates an over-temperature fault on the chassis: ON – indicates on over-temperature fault OFF – indicates normal temperature levels
SM Active—1 (Green)	Subnet Manager running on sMB #1
CM Active—1 (Green)	Chassis manager running on sMB #1
SM Active—2 (Green)	Subnet Manager running on sMB #2
CM Active—2 (Green)	Chassis manager running on sMB #2
Eth—1 and 2	Each Ethernet port, used for the management interface, has two LEDs: Link (Green) and Activity (Orange)

CAUTION

If only one sMB is installed, make sure that the Ethernet cable is connected to the appropriate port.

The ISR 2012/2004 chassis is pre-assembled at the factory with the sCTRL board installed. To replace an sCTRL, use the following procedure.

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To replace an sCTRL board:

Step 1 Remove all cables connected to the sCTRL board.

Step 2 Loosen the screws that secure the board to the chassis slot.

Step 3 Remove the board by sliding it out of the chassis.

Step 4 Replace with a new sCTRL board, place and tighten the screws, and complete the cable connections. Check the sCTRL LEDs to verify correct operation.

6.11 Fan Units (sFUs)

The ISR 2012/2004 chassis is pre-assembled at the factory with the sFUs installed.

The sFUs are hot swappable modules.

At system startup, fan speed is set to turbo mode until adequate temperature is reached. Fan speed is then set to normal mode.

ISR 2012

The ISR 2012 hosts an sFU-4 and an sFU-8. When replacing one of the ISR 2012 sFUs, the other takes over and changes to turbo mode, to ensure proper system ventilation.

The ISR 2012 sFUs can be replaced within five minutes without interruption to the operation of the chassis and without disconnecting it from power.

ISR 2004

The ISR 2004 hosts an sFU-2004 and an sFU-8. When replacing one of the ISR 2004 sFUs, the other takes over and changes to turbo mode, to ensure proper system ventilation.

The ISR 2004 sFU-8 can be replaced within three minutes without interruption to the operation of the chassis and without disconnecting it from power.

6.11.1 sFU-4/sFU-2004

The sFU-4/sFU-2004 Vertical Fan Unit, shown in Figure 6-17, is part of the ISR 2012/2004 air cooling system; it provides cooling of the sLBs. It includes four fans with fan speed control; fan speed is dynamically controlled as a function of temperature.

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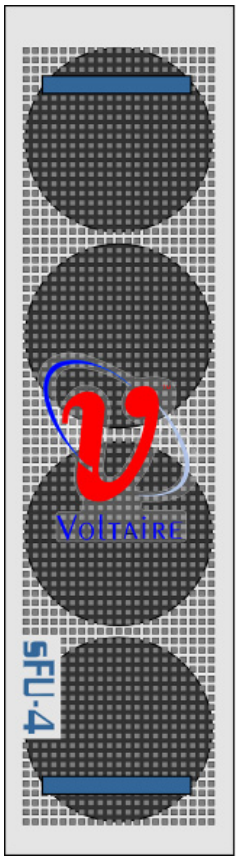

Figure 6-17. ISR 2012 sFU-4 Front Panel

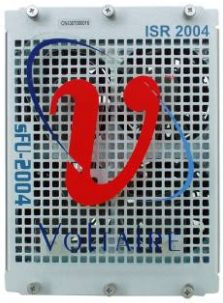

Figure 6-18. ISR 2004 sFU-4 Front Panel

CAUTION

Never remove the sFU-4/sFU-2004 and sFU-8 at the same time; at least one fan unit must be installed at all times.

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To replace the sFU-4/sFU-2004:

Step 1 Loosen the screws that secure the sFU-4/sFU-2004to the chassis.

Step 2 Remove the sFU-4/sFU-2004 by sliding it out of the chassis.

Step 3 Within five minutes, replace with a new sFU-4/sFU-2004 and place and tighten the screws.

Step 4 Listen for proper sFU-4/sFU-2004 fan operation.

6.11.2 sFU-8

The sFU-8 horizontal Fan Unit, shown in

Figure 6-19, is part of the ISR 2012/2004 air cooling system; it provides cooling of the Fabric boards and the sMB boards. It includes eight fans with fan speed control; fan speed is dynamically controlled as a function of temperature.

LED indications provide an onsite report on the operating conditions of the air cooling system modules, and provide an alarm indicator in the event of a high temperature condition.

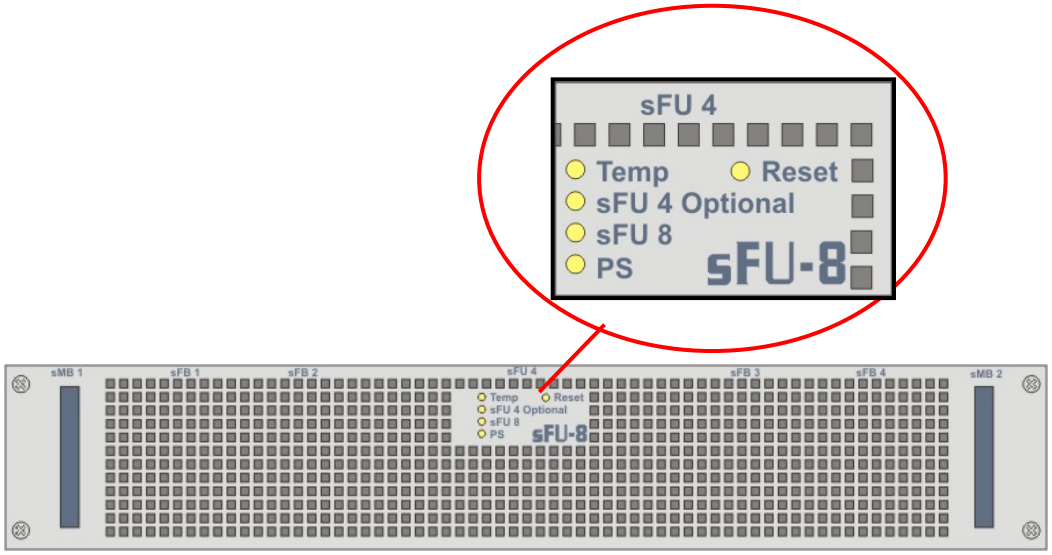

Figure 6-19. sFU-8 Front Panel

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The sFU-8 unit provides the following LED indications:

Table 6-8. sFU-8 LEDs

Indication	Description
Temp (Orange)	Indicates an over-temperature fault on the chassis: ON – indicates on over-temperature fault OFF – indicates normal temperature levels
sFU4 (Orange)	Vertical fan unit fault indication. Indicates that at least one of the four fans has failed.
sFU-8 (Orange)	Horizontal fan unit fault indication. Indicates that at least one of the eight fans has failed.
PS (Orange)	AC-DC power supply fault indication. Indicates that at least one of the main AC-DC power supplies has an AC or DC fault.

To replace the sFU-8:

Step 1 Loosen the screws that secure the sFU-8 to the chassis.

Step 2 Remove the sFU-8 by sliding it out of the chassis.

Step 3 Replace with a new sFU-8 and replace the screws (within five minutes for the ISR 2012, within three minutes for the ISR 2004).

Step 4 Listen for proper sFU-8 fan operation and check the LEDs.

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Chapter 7. Installing Cables - Chassis Ports Physical Configuration

In This Chapter

This chapter provides the software ports physical configuration according to the preferred cables and instructions on how to update the physical ports.

For the list of cables supported by Voltaire and their specifications refer to Section 3.18.

This chapter contains the following sections:

7.1 Overview 7-2

7.2 Setting Chassis Ports Physical Configuration via the CLI when Replacing Cables 7-3

7.3 1X SDR Reset 7-5

7.4 Detecting and Troubleshooting 1X Cable Width Problems 7-5

7.1 Overview

Active cables have an active component that amplifies the signal. They are implemented as optic or copper cables and have proven to be a high-performance option and support longer reaches.

Passive cables are standard copper cables.

Voltaire certifies and approves specific cable vendors. Various cable vendors may have different port parameters requirements. The user can choose to use the Voltaire InfiniBand default cables settings or replace them with other certified cables.

This chapter defines the software ports physical configuration according to the preferred cables. In addition, it provides step-by-step instructions on how to update the physical ports using the CLI config active-cable menu when swapping cables from default to other Voltaire certified cables.

The CLI config active-cable menu allows the user to configure the physical parameters of the chassis external InfiniBand ports according to the connected cable. This includes:

- Regular (passive) cables – copper passive
- Active cables – either optic media converter, active optic cable, active copper cable

For each non-default active cable type Voltaire will provide a .csv file with a README file containing the Switch port configuration according to the supported cable parameters. The README file provides a list of vendors currently supported by Voltaire, as well as relevant cable types and lengths.

Both files, the CSV file and README file, are available to the user either in media format (e.g., CD) or from the Voltaire Support website.

IMPORTANT

ONLY cables that are certified and approved by Voltaire are considered supported cable. Please check the README file for the list of cables currently supported by Voltaire.

IMPORTANT

The active-cable menu applies to all the cables (active and passive).

Note that all optic cables are active cables.

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7.2 Setting Chassis Ports Physical Configuration via the CLI when Replacing Cables

Voltaire certifies and approves specific cables.

Any other cable is not supported by Voltaire.

NOTE

The CLI Active-cable menu is provided for updating the **csv** file listing the parameters of the Voltaire supported cables. This file may therefore be updated also at the customer site. Notwithstanding this, prior to adding any new cable to the csv file, Voltaire must first certify and approve the addition.

Note that the Import/Export commands use the remote definitions (i.e. server IP address, user name, and password) (See CLI on Configure Remote Server Settings in the CLI Reference Guide).

To set the Chassis Physical Ports Configuration when installing cables:

Step 1 Check the Readme file provided with the csv file to make sure that Voltaire supports the cables being used. The Readme file lists the supported vendors, and relevant cable types and lengths.

Step 2 Copy the supplied csv file to the FTP/SCP server location you have defined on your remote server. (See CLI Configure Remote Server Settings in the CLI Reference Guide)

Step 3 Rename the supplied csv file to: **optics_ini.csv**

Step 4 Download the Ports Configuration **optics_ini.csv** from the remote server by running the following command:

ISR9096-32ac(config-active-cables)# importFile optic-setup-config `[remote path]`

This downloads the **optics_ini.csv** from the remote server, using previously defined server name, user name, and password. Note that the name of the **optics_ini.csv** must remain unchanged.

This will override the Voltaire default physical port configuration and update the chassis according to the requirements for your specific cables (see supported cable list, section 3.18).

Example

```
ISR9096-32ac(config-active-cables)# importFile optic-setup-config
/home/kobib/phyconfig
Downloading the Optic Ports Configuration has completed successfully.
```


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Optional If in the Active cables 1X/SDR reset mode command is disabled (Note that it is enabled by default)

1. Verify which ports are in SDR or 1X by running a **port-verify.sh** command from the utilities menu (Privileged Mode).
2. Manually run a `port reset -R` command from the utilities menu to reset all ports

   OR

   Manually run a `port manage -r` command from the utilities menu to reset a specific ports.

Refer to the CLI Utilities Menu (CLI Reference Guide) for more information on how to use these commands.

7.2.1 Backing up the Chassis Ports Physical Configuration

To backup the Chassis Physical Ports Configuration:

Step Upload the chassis ports physical configuration (csv file) to optics_ini.csv file (Ports Configuration) by running the following command:

ISR9096-32ac(config-active-cables)# exportFile optic-setup-config `[remote path]`

This uploads the Upload the chassis ports physical configuration to the remote server, using previously defined server name, user name, and password.

Example:

```
ISR9096-32ac(config-active-cables)# exportFile optic-setup-config
/home/kobib/phyconfig
Export file succeeded.
```


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7.3 1X SDR Reset

Verification of the fabric is an integral part of running a successful grid.

The system tries to detect the maximum link width between any two end points to optimize performance. If a 1X link is detected, either one of the ports is faulty or the cable is damaged.

To view the status of 1X SDR reset mode via the CLI:

Step From the switch CLI config-active-cables, make sure that the active cables 1X/SDR reset mode is set to enable (default), by running the following command:

Example

```
ISR2004-3916(config-active-cables)# 1x-sdr-reset-mode show
Active cables 1X/SDR reset mode: enable
```

To set the status of 1X SDR reset mode via the CLI (if disabled):

Step If the 1X/SDR reset status not enabled, run the following command:

```
ISR2004-3916(config-active-cables)# 1x-sdr-reset-mode set enable
```

This resets the external port after configuration if the port does not operate in an optimal width and speed (enabled = active). Enabled speed/width is checked on both sides of the link.

7.4 Detecting and Troubleshooting 1X Cable Width Problems

7.4.1 Viewing Cable Width Problems

GUI (Trap Table)

A trap is issued to notify the user about the 1X link, as shown in the example below.

Type	Date/Time	Source	Description	Category	Event ID
Minor	Mon Jul 04 17:56:37 IDT 2005	0008f104004004a8 / sLB-24 4 / Internal Port 10	1x port was found.	Port Counters Error	Osm 1x
Minor	Mon Jul 04 17:55:20 IDT 2005	0008f104004004a8 / sLB-24 4 / Internal Port 10	1x port was found.	Port Counters Error	Osm 1x

Figure 7-1. Trap Table – 1 X Link

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CLI

You can view which ports are in SDR or 1X by running a **port-verify.sh** command from the utilities menu (Privileged Mode).

7.4.2 Troubleshooting Cable Width Problems

The system automatically detects internal IB ports in 1X mode after power up, reboot, module installation resetting a port using the Built-in Test and toggles 1X links (1x-reset). This applies to all Voltaire Grid Director/Switch platforms.

To troubleshoot 1X cable width problems:

Step 1 In the GridVision Fabric Manager, right-click the trap and select View Event. The following Event Data Information is displayed, showing which ports are connected on both ends with the 1X link. The software automatically resets the 1X.

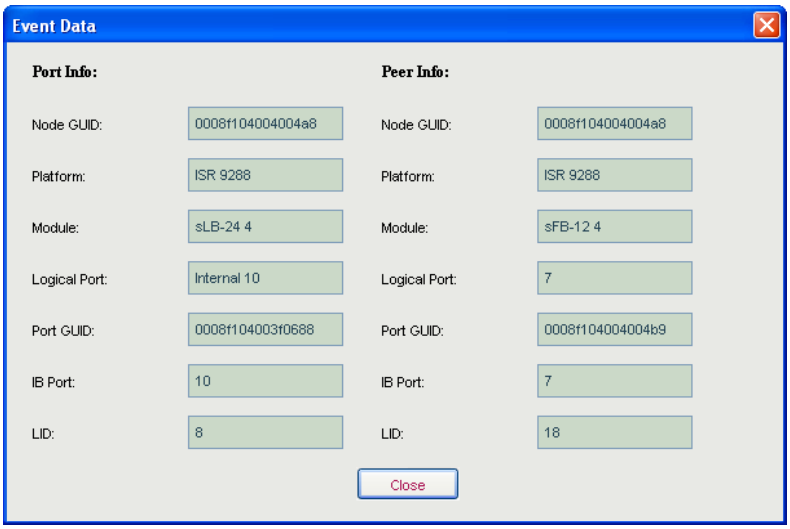

Figure 7-2. GridVision Fabric Manager Event Data Window

The details of this trap can be viewed by accessing the Fabric Statistics **portcounters.csv** file from either the GridVision Fabric Manager or the CLI.

Step 2 Reseat both connectors on the 1X link or if this does not fix the problem, proceed to step 3.

Step 3 Replace the cable that connects between these two ports.

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If none of this works, one of the ports may be faulty. In that case, proceed as described below.

If the cable is connected between Host and Switch:

Step 1 Swap cables and connect the 1X cable to a different port in the switch to verify if the problem remains on the switch port.

Step 2 If it remains, use the second port on the HCA (if available) or use another HCA.

Step 3 If it remains, replace the Grid Director Line Board (sLB), as required.

If the cable is connected between two switches (Switch A and Switch B):

Step 1 Swap cables on Switch A and connect the 1X cable to a different port in switch A to verify if the problem remains on the switch port.

If the problem is solved, replace the faulty Grid Director Line Board (sLB).

Step 2 If it remains, swap cables on Switch B and connect the 1X cable to a different port in switch B to verify if the problem remains on the switch port.

If the problem is solved, replace the faulty Grid Director Line Board (sLB).

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Chapter 8. Verifying Installation

In This Chapter

This chapter describes how to verify that the ISR is correctly operating once installation has been completed.

This chapter contains the following sections:

8.1 Verifying Installation 8-2
8.2 Where to Go Next.....8-2

8.1 Verifying Installation

Verifying installation of the ISR 2012/2004 consists of making sure that it starts up properly and that the network connections are operational.

8.1.1 Verifying Start-up Operations

To verify that the ISR 2012/2004 starts up properly:

Step 1 Observe the Power Supply LEDs on the Fans module front panel to make sure the power supplies are operable.

Step 2 Listen and check for airflow to make sure the fan assembly is operating.

Step 3 Observe system LEDs to verify that the system is running and operational.

Step 4 If any of these conditions are not met, refer to Appendix A.2, to isolate and if possible, resolve the problem.

8.1.2 Verifying Network Connections

Verifying the network connections consists of making sure that the following network ports are operational:

- InfiniBand
- 10/100 Ethernet management

8.2 Where to Go Next

The ISR 2012/2004 is now fully functional. If a Subnet Manager resides on the IB fabric, whether in the ISR 2012/2004 or elsewhere, the switch and the fabric will come up automatically.

Once you have verified that the ISR 2012/2004 hardware is properly installed, it is ready for optional system configuration.

To configure the system software, refer to Voltaire Switch User Manual.

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Chapter 9. System Cabling

In This Chapter

This chapter presents instructions and guidelines for preparing the ISR 2012/2004 cabling and port pinout information:

- 4X InfiniBand Port
- 12X InfiniBand Port
- Gigabit Ethernet/Fibre-Channel Port (fibre-optic)
- Gigabit Ethernet (copper) 1000 Port/Ethernet Management 10/100 Port

This chapter contains the following sections:

9.1 Cabling Guide Brackets Installation 9-2
9.2 InfiniBand Cabling Guidelines 9-5
9.3 Replacing sLBs.....9-7
9.4 Connecting to the Management Ports.....9-8
9.5 Installing the Optional Copper-to-Fibre Converter 9-12
9.6 Router Blade Connections.....9-13

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9.1 Cabling Guide Brackets Installation

NOTE

Selecting the optimal InfiniBand cable length depends on the overall cluster configuration and requires proper planning to produce orderly and maintainable cabling.

NOTE

The ISR2012 space in the Rack should be free from obstructions such as power strips.

The Cabling Guide brackets are optional.

The rack mounted Cabling Guide Bracket should be installed with its bend facing the outside, otherwise it will prevent sLBs from being inserted or removed.

It is recommended that the rack rails that overlap with the 12U of the ISR2012 chassis are free of PDU and power inlets.

9.1.1 ISR 2012 Cabling Guide Brackets

The ISR 2012/2004 offers two options for Cabling Guide brackets: chassis mounted and rack mounted. The selection depends on customer-specific rack site requirements:

- Designed to accommodate adequate cable bend radii, chassis gripping brackets are installed on the chassis itself
- Rack gripping brackets are installed on the Rack's rail when there is not enough space left to route the cables between the Chassis and the Rack's rail

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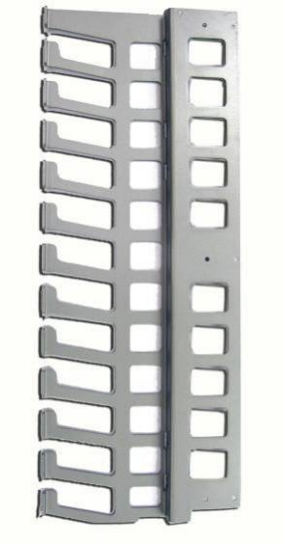

Figure 9-1. ISR 2012/2004 Chassis Gripping Bracket

Figure 9-2. ISR 2012/2004 Rack Gripping Bracket

9.1.2 ISR 2004 Cabling Guide Brackets

There is only one type of bracket for the ISR 2004. These can be installed on the chassis or on the rack rail.

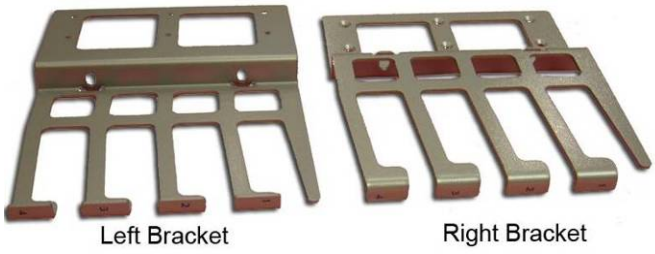

Figure 9-3. ISR 2004 Cabling Guide Brackets

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9.1.3 Installing Cabling Guide Brackets

To Install Chassis Gripping Cabling Guide Brackets:

The ISR 2012/2004 Chassis Gripping Brackets are shown in Figure 9-1.

Step 1 Install the Cabling Guide Brackets on the ISR 2012/2004 chassis with six screws, using the six screw holes on the flat part of the bracket.

Step 2 Attach the rear side of the chassis to the rear side of the 19” rack.

An example of an ISR 2012/2004 chassis with the Cabling Guide brackets is shown in Figure 9-4.

Figure 9-4. Cabling Guide Brackets, Installed - Chassis Gripping

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To Install Rack Gripping Cabling Guide Brackets:

The Rack Gripping Brackets shown in Figure 9-2 are installed on the ISR 2012/2004 rack's rear rail, as follows:

NOTE

The ISR 2004's Cabling Guide Brackets can also be mounted on the rack's rear rail. If this is the preferred choice, proceed as described below.

Step 1 Install the Cabling Guide Brackets at the rear of the rack itself, on the rail, and not on the ISR 2012/2004 chassis. It is not important from the Cable Management perspective where on the Rack the ISR 2012/2004 is installed.

Step 2 Install the Cabling Guide Brackets in parallel with the ISR 2012/2004 chassis so that each Line Board lines up with its corresponding hanger on the Bracket.

9.2 InfiniBand Cabling Guidelines

It is recommended to dress the cables connected to the InfiniBand connectors of each sLB into two groups, left and right, and fasten them down gently after connectivity has been verified.

The cables from the same half of the Line Boards are bundled on the corresponding hangers and will be routed down along the Rack side wall.

Cables should be arranged so that each Line board's cables don't interfere with the neighbor Line Board insertion or removal.

9.2.1 Connecting the InfiniBand cable to an ISR 2012/2004 sLB

To connect an InfiniBand cable to an ISR 2012/2004 sLB:

Step 1 Route the cable to the nearest Cabling Guide bracket hanger position.

Step 2 Position the InfiniBand cable connector opposite a connector on an sLB, pull the locking tab toward you, and push the connector in place.

Step 3 Verify that the cable is inserted properly into the connector by gently tugging the cable; verify that the Link State green-colored LED lights (and does not flash) indicating a good physical connection.

Step 4 Gently fasten in place with Velcro tie or tie wraps.

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CAUTION

Avoid using tie wrap guns or similar tools; do not fasten the InfiniBand cable too tightly, as this may cause irreversible damage to the cables.

Tie wraps and zip ties can damage the cables. Velcro tie is the recommended option.

CAUTION

Do not bend the InfiniBand cables too sharply. The recommended minimum bend radius is 4” (10 cm).

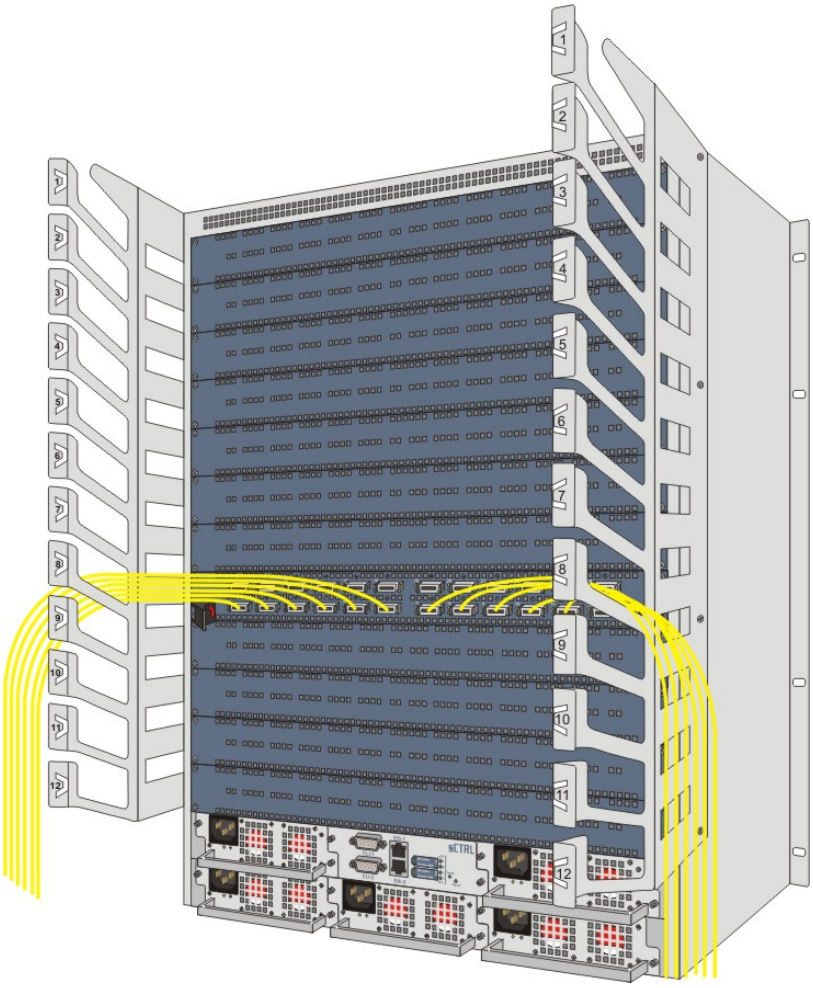

Figure 9-5. InfiniBand Cable Dressing

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9.2.2 InfiniBand Cabling—Do's and Don'ts

Do not kink the cable.

Do not over-bend the cable behind the connector.

Do not twist the connector.
If it is necessary to re-orient the connector, start the adjustment further down the cable, at least 75 cm away from the connector, so the twist occurs gradually along the cable instead of abruptly near the connector.

9.3 Replacing sLBs

If the cabling is done according to the guidelines described in InfiniBand Cabling Guidelines, on page 9-2, ISR 2012/2004 sLBs can be replaced without interfering with traffic of operation of adjacent sLBs, even when the ISR 2012/2004 is fully populated with sLBs.

It is permissible to connect and disconnect InfiniBand cables while the ISR 2012/2004 is powered on.

To replace an sLB:

Step 1 Carefully remove the InfiniBand cable connections from the sLB connectors (located at the rear side of the chassis). It is recommended to gently secure the removed cables using a Velcro tie, neatly placing the cables on the outside of cable guide bracket rails.

Step 2 Remove an sLB as described on page 6-13.

Step 3 Insert a new sLB as described on page 6-13.

Step 4 Replace the cable connections.

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9.4 Connecting to the Management Ports

The Voltaire ISR 2012/2004 has management ports located on the front panel of the sCTRL board. This includes two interfaces: a serial interface for local console access and a 10/100 Ethernet interface for network access. The serial port can be used to connect to a PC running terminal emulation software for ISR 2012/2004 management tasks. The Ethernet port is connected to an IP network and is used either to run a CLI (via Telnet) or the GUI (via a Web browser) management tasks.

NOTE

The I^2C interface is intended for the use of Voltaire technical support personnel only.

Through the management network, you can manage the ISR 2012/2004 using a Command Line Interface (CLI), a web-based Device Manager GUI, or a third-party SNMP manager. Refer to the relevant User Manual for more information.

If the configuration calls for out-of-band management of the ISR 2012/2004, either using a serial connection or over Ethernet, the management network must be connected to the corresponding management ports on the rear of the Chassis. Both types of management network can be connected simultaneously.

There are two Ethernet connectors and two serial ports. These correspond to the sMB boards on the right and left sides of the Chassis front.

Connect the Ethernet cable(s) to the RJ45 connector(s) on the ISR 2012/2004 that correspond to installed sMB boards. Connect the serial cable(s) to the DB-9 connector(s) in a similar manner.

To connect to the Management port Ethernet Interface:

Step 1 Connect the end of the management cable with the single RJ45 connector to the Management port on the ISR 2012/2004.

Step 2 Connect the end of the cable with Ethernet connector to the appropriate devices/network.

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To connect to the Management port Serial Interface:

Step 1 Connect the end of the management cable with the single RJ45 connector to the Management port on the ISR 2012/2004.

Step 2 Connect the end of the cable with the DB9 serial connector to a PC or a console. The PC/console must support VT100 terminal emulation and should be equipped with terminal emulation software such as HyperTerminal or ProComm Plus.

Step 3 Make sure that your PC/console terminal emulation software is configured to communicate with the ISR 2012/2004 via hardware flow control. Configure the baud rate and character format of the PC terminal emulation program to match these RS-232 management port default characteristics:

- 38,400 baud
- Eight data bits
- One stop bit
- No parity
- Flow Control – None

Management Port Pinout

Use modular RJ45, straight-through UTP cables to connect the 10/100 Fast Ethernet ports to end systems. Use modular RJ45 cross-connect cables to connect to external switches and routers.

The table below lists the signals for Management Port pinout of the RJ45 connector.

Table 9-1. RJ45 Ethernet Connector Pinout

Pin	Signal	Description
1	TxD+	Transmit data +
2	TxD–	Transmit data -
3	RxD+	Receive data +
4	NC	No connection
5	NC	No connection
6	RxD–	Receive data –
7	NC	No connection
8	NC	No connection

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SERIAL INTERFACES

DB9 I2C Interface

The DB9 I^2C Interface provides an I^2C master bus to the ISR 2012/2004 chassis I^2C tree.

DB9 RS-232 Interface

Each sMB provides two RS-232 ports, one for internal debug only and the second is routed to the card's panel for CLI Terminal.

The following table lists the signals for CLI Terminal Port pinout of the DB9 connector.

Table 9-2. DB9 RS-232 CLI Connector Pinout

Pin	Signal	Description
1	NC	No connection
2	RX	Receive data
3	TX	Transmit data
4	NC	No connection
5	GND	Ground
6	NC	No connection
7	NC	No connection
8	NC	No connection
9	NC	No connection

10 GbE Interface

The Fast Ethernet Management port supports an RJ-45 connector. The table below lists the signals for RJ-45 connector pinout.

Table 9-3. 10 GbE Interface Connector Pinout

Pin	Signal	Description
1	TxD+	No connection
2	TxD–	No connection
3	RxD+	Receive data +

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Pin	Signal	Description
4, 5, 7, 8	NC	No connection
6	RxD–	Receive data

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9.5 Installing the Optional Copper-to-Fibre Converter

An optical adapter and a Fibre-optic cable are used to provide 850 nm optical bandwidth transport for an ISR 2012/2004 4X 20 Gbps port over distances of up to 1000 ft (300 m). The 4-channel full-duplex optical adapter shown in Figure 9-6 transmits and receives 2.5 Gbps channels over a single optical cable transparent to the user, while dissipating less than 1 Watt.

An MPO 12 fibre jacketed ribbon, multi-mode, is used to connect between two optical adapters. A set of two optical adapters and a single fibre jacketed ribbon replaces a copper InfiniBand cable, providing a connection over distances of up to 1000 ft (300 m). Refer to the Specification Section 3.18.2 for the list of optical cables supported for DDR.

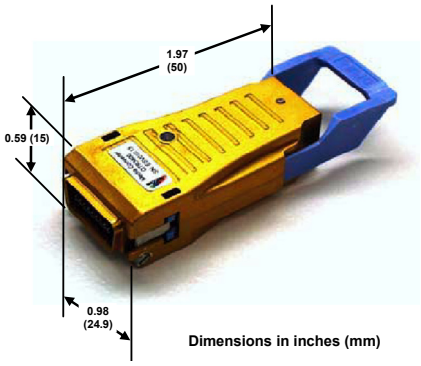

Figure 9-6. Copper-to-Fibre Converter

The sLBs supply the optical adapter power when plugged into one of the InfiniBand ports on the unit's rear panel as shown in Figure 9-7.

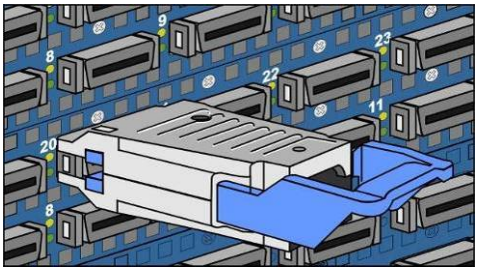

Figure 9-7. Copper-to-Fibre Converter Connection

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Table 9-4 provides the optical adapter technical data.

Table 9-4. Optical Adapter Technical Data

Subject	Details
General	- 850 nm VCSEL technology - Hot pluggable into InfiniBand x4 port connector - Small form factor: 1.97” (50 mm) x 0.59” (15 mm) x 0.98” (24.9 mm)
Power Supply	0.8/1.0 Watt, typical/maximum power dissipation
Case Operating Temperature	32°F to 158°F (0°C to 70°C)

9.6 Router Blade Connections

This section provides instructions on cable connections to the IPR modules, installed in the ISR 2012/2004 sRBD-20

9.6.1 Connecting to the IPR GbE Ports

To connect to the Gigabit Ethernet port:

Step 1 Connect the small form-factor SFP connector to the GbE port on the IPR module.

Step 2 Connect the other end of the cable to the appropriate device.

Refer to the IPR manual listed in the Related Documentation Section, at the beginning of this document.

9.6.2 Connecting to the sRB-20210G 10 GbE Ports

To connect to the 10 Gigabit Ethernet port:

Step 1 Connect the connector (the small form-factor connector) to the 10 GbE port on the sRB-20210G module.

Step 2 Connect the other end of the cable to the appropriate device.

Refer to the IPR manual listed in the Related Documentation Section, at the beginning of this document.

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Appendix A Troubleshooting

In This Chapter

This appendix provides troubleshooting procedures for problems encountered during installation.

This appendix contains the following sections:

A.1 Solving Operation Problems A-2
A.2 Identifying Startup Problems A-3
A.3 Contacting Customer Service A-4

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A.1 Solving Operation Problems

When a startup problem is encountered, it is usually attributed to a single component, which is more difficult to isolate than a problem to a subsystem.

When troubleshooting, it is suggested that you start by troubleshooting each separate subsystem in the ISR 2012/2004, since there are fewer subsystems than components.

The ISR 2012/2004 chassis consists of the following subsystems:

- Power supplies that operate whenever system power is connected
- Chassis fan units which operate when the system power is connected. The fan units will not continue to operate when power is disconnected
- sMB (CLI/Eth)
- sLB
- sFB 4/12

The following are simple checks you can make to determine if there is a fan problem:

- Listen to the fan units to determine they are operating
- Check for any obstructions restricting airflow through the ISR 2012/2004

If you determine that the fan is not operating, contact a customer service representative.

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A.2 Identifying Startup Problems

Perform the following steps when you connect the power cord to the ISR 2012/2004:

Step 1 Listen for the chassis fans operation. If they do not operate, the fans may need to be replaced. Continue to Step 2 to determine if the Power Supplies are operational. If you determine that the power supplies are functioning normally and that the fans are faulty, contact a customer service representative. If the ISR 2012/2004 fan does not function properly at initial startup (there are no installation adjustments that you can make), contact a customer service representative.

Step 2 Check the Power Supply LEDs on the rear panel. The Power LEDs illuminate immediately upon the connection of power to the ISR 2012/2004. If the LEDs are not on, the power supplies may need to be replaced.

Step 3 Check the Link LEDs on the sLBs front panel for the various ports.

In the event of a system lock-up in the Voltaire ISR 2012/2004, the reset button can be used to reset and reboot the system. The system has two Reset buttons: one is located on the front panel of the sFU-8 fan module and one on the front panel of the sCTRL board.

To reset the switch, push the button using a thick wire or tip of a pen until the system reboots. Remove the wire or pen immediately afterwards.

Step 4 Verify that the PC terminal emulation program is set correctly and that the PC is connected properly to the Console management port if the boot information and CLI prompt are not displayed.

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A.3 Contacting Customer Service

If you are unable to solve a startup problem after using the troubleshooting suggestions in this chapter, contact a customer service representative for assistance and further instructions. Before you call, have the following information ready to help your service representative assist you as quickly as possible:

- The date that you received the ISR 2012/2004 chassis and modules
- The chassis serial number
- The type of software and release number
- The maintenance agreement or warranty information
- A brief description of the problem
- A brief explanation of the steps you have already taken to isolate and resolve the problem

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Appendix B Definitions & Acronyms

AWG	American Wire Gauge
Clos Topology	Non-blocking hierarchical switching fabric architecture
BTU	British Thermal Unit
CGB	Cabling Guide Brackets
CLI	Command Line Interface
DDR	Double Data Rate
FM	GridVision Fabric Manager
FRU	Field-Replaceable Unit.
GA	General Availability
GridVision™	Voltaire Management Software
GUI	Graphics User Interface
IB	InfiniBand
ISR 2012/2004	ISR 2012/2004 Grid Director; can also be referred to as switch or chassis
PMA	Performance Management Agent (PMA)
sCTRL	Control Board
SDR	Single Data Rate
sFB	Short for DDR Fabric Board
sFB-2012	DDR Fabric Board
sFU	Fan Unit
sFU-4	Vertical Fan Unit
sFU-8	Horizontal Fan Unit for the Grid Director ISR 2012/2004
sLB	Line Board
sRB-20210G	10GbE module for the ISR 2012/2004
SM	Subnet Manager
SMA	Subnet Management Agent (SMA)

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sMB	(High Memory) Management Board
sMB	High Memory Management Board
SNMP	Simple Network Management Protocol
sPSU	Power Supply Unit
sRBD-20	Router Blade Drawer
UL	Certificate of Safety (US)

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